A Study of Superficial and Semantic Organization in Immediate and Delayed Cued Recall in Relation to Cognitive Rigidity-Flexibility

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C O N T E N T S

CHAPTER - I

INTRODUCTION

CHAPTER - I

Psychologists have long been interested in the way organization affects memory. Study of the complex organizational processes involved in learning of verbal items and their impact on subsequent retention has achieved special prominence in experimental psychology in recent years. Over the years there have been several, rather different, approaches to the problem of clustering or organization. Clustering was first observed by Bousfield and Sedgwick (1944) while studying sequential characteristics of associative responses. Clustering has come to mean the sequential organization during recall of items that are related to one another in some way even though the items themselves are exposed in a random order during study trials. Clustering is said to have occurred if there is a tendency for the related items to follow each other sequentially during recall. When clustering is present, second order or conceptual habits are presumed to be engaged. The clustering phenomenon is largely a product of the contemporary period.

The terms organization refers to the relations between to-be-remembered items. Organization has been defined as a process through which certain relationships among the set of verbal items are established (Mandler, 1972). In its operational sense, organization refers to

the discrepancy between the input and the output item orders (Tulving, 1968). Such organisation occurs "when the output order of the items is governed by phonetic or semantic relations among items or by subjects prior extra-experimental or intra-experimental acquaintance with the items constituting the list" (Tulving, 1968). The organization which is observed during recall could occur at the time of input, that is, presentation of the stimulus list, or at the time of retrieval, that is, when the subject recalling the words. However, there is increasing evidance (Anisfeld & Knapp, 1968; Rohwer, Shuell, & Levin, 1967; Tulving & Osler, 1968) that organization must occur at the time of presentation in order to be effective.

Tulving (1968) has distinguished between two types of organization. The first of these referred to as primary organisation. Primary organization describes strategies based on relations such as position in the list, or grouping of items in space or time. This type of organization is defined as the consistent discrepancies between input and output orders which are independent of the subjects prior familiarity with the input items. The serial position effect (e.g. Murdock, 1962) and the tendency for subjects to recall the terminal items first (Postman and Keppel, 1968; Shuell and Keppel, 1968) are the examples of primary organisation. The other type of

organization is referred to as secondary organization. Organisation which involves the semantic aspects of items is termed secondary organisation. This type of organization is dependent upon the subjects prior acquaintance with the items in the stimulus list. Secondary organisation reveals itself in differences between the ordering of items in the presentation sequence and the subject's recall sequence as when, for instance, the word 'big' and 'large' are recalled one after the other even though they appeared widely separated in the presentation sequence. This reordering of items can only occur if the subject is able to choose his own recall sequence, clustering on the basis of meaning would be an example of secondary organisation.

Three paradigms have been developed for the study of organisation, namely, categorial organisation, associative organisation, and subjective organisation. These differ primarily in the experimental treatment given for inducing clustering. Two of these paradigms are similar in the sense that the basis of organisation is determined by the experimenter. Categorical organisation refers to list of to-be-remembered items which fall into a number of semantic categories such as birds, professions and furniture etc. This type of organisation is a special case of organisation in which certain categorical items are presented to subject in a random order and the subject recall these items in chunks or clusters.

Experiments concerned with categorical organization are characterized by the selection of to-be-remembered words from taxonomic categories such as animals, names, vegetables and professions (ANVP). Bousfield (1953) initiated a series of experiments using categorical organization with a list of sixty nouns composed of fifteen words from each of the four taxonomic categories: animals, names, vegetables, and professions. Bousfield observed that words belonging to the same category tended to cluster together in the subject's output. In subsequent studies, Bousfield and Cohen (1953,1955) found that recall of any item belonging to a given category tended to activate the recall of the superordinate or category itself, which in turn aided the recall of other members of that category. Clustering was found to be greater for high frequency than for low frequency words (Bousfield & Cohen, 1955) and also for high frequency taxonomic responses (as determined by the normative data) than for low frequency taxonomic responses (Bousfield, Cohen and Whitmarsh, 1958). Cohen et al.(1957) using taxonomic norms found that clustering was higher with blocked presentation for both high and low frequency lists. Recall was also better if followed by an immediate test and if the presentation rates were slower.

Tulving and Pearlstone (1966) found that subjects in the group who were cued with the category names recalled more words than the unaided group. The cues greatly facilitated recall.

The second paradigm, i.e., associative organization, refers to the situation in which the stimulus list is comprised of associatively related words which are not members of the same conceptual category. Jenkins and his colleagues were the first who investigated associative relationships in recall (Jenkins and Russell, 1952). They discovered that clustering occurs when list contains pair of words in which one word is a common response or associate to the other as a stimulus (e.g., chair as a response to table). The list is presented in a random order during the study trials, with the associates likely to be widely scattered. A high degree of associative clustering was observed in the recall protocols; associated word pairs tended to be recalled together. Later studies (e.g. Jenkins, Mink, and Russell, 1958; Mathews, Marcer and Morgan, 1964) found that the tendency to recall the two members of each pair in succession increased with higher interpair associative strength. Similarly, Deese (1959,1961,1962) also found positive relationship between the degree of interitem associative strength within lists and the amount of free recall. Thus associative organization suggests that strong preexperimental habits, such as

word associations, tend to recombine items during output even though the members of each pair are separated during input.

Cofer (1965) accepted the existance of both associative and categorical organization, although he did not consider the distinction to be useful. . He concluded that learners employ both types of mechanisms, depending on the nature of the test conditions. Dominance of associative relationship in items leads to associative organization whi le the dominance of categorical relationship in the items results in categorical organization. However, neither categorical nor associative clustering is complete. More specifically, neither all the items in a category nor all the associatively related items are recalled together. This suggests that the organization in the list, as it is defined by the experimenter, is not the same as the organization the subject perceives and makes use of it in setting up his plans for storing and retrieving the words. Consequently, experimenter-imposed organization is not always the most revealing method for investigating how the subject codes the to-be-remembered items.

The third paradigm for the study of organization is subjective organization that differs from the other two paradigms in that the basis of organization is not predetermined by the experimenter. The first experiment

which showed that subjective organization occurs in the learning of a list of unrelated items, was reported by Tulving in 1962. Tulving defined subjective organisation as the tendency to recall words in the same order on successive learning trials, event if there are no experimentally manipulated sequential dependencies among the words of a learning list. The stimulus list is comprised of so-called unrelated words, that is, a random sample of words in which the experimenter has made no attempt to include words are categorically or associatively related. Thus, the subject is more or less free to organize the words the way he wishes. Organization is determined by the extent to which the subject recalls the words in the same order on two successive trials. Tulving (1962) showed that the number of words recalled from lists of 'unrelated' words increased over successive trials of presentation and recall. This suggests that more words are recalled as chunks are more effectively formed. In a later study, Tulving showed that the number of subjective chunks stay fairly constant from trial to trial and increases in the number of words recalled from the list must be due to increases in the size of chunks. There appears to be a limit on the number of chunks recalled but the size of each chunk is increased as learning proceeds.

As stated somewhere else most of the studies to date have been concerned with categorical organization-organization based on semantic categories. The semantic association effect was first reported by Meyer and Colleagues (Meyer, & Schanaveldt, 1971; Meyer, Schanaveldt, and Ruddy, 1975). Using a lexical (word/nonword) decision task these researchers have demonstrated that a word, the 'target', processed shortly after an associated word, the "prime", is responded to more rapidly than when that same word is processed by a nonassociate. To use the classical example DOCTOR is processed more rapidly following NURSE than following BUTTER.

Many researchers have reported that decision based on pairs of semantically similar concepts can be made more rapidly than decisions based on pairs of semantically dissimilar concepts (e.g., Collins and Quillian, 1969; Meyer & Schanaveldt, 1971; Shulman and Davison, 1977; Schanaveldt and McDonald, 1981). Adults are better at remembering words from lists which contains semantically related subsets than words from unrelated lists (e.g., Cofer, 1966; Cofer, Bruce, and Reicher, 1966). In addition, if the semantically related words are separated in the list, adult tend to cluster them by meaning in output (e.g., Bousfield, 1953; Jenkins and Russell, 1952). Moreover, the young children are also better at remembering items which are all from one category than items which

are unrelated in meaning (e.g., Cole, Frankel, and Sharp, 1971; Kobasigawa and Orr, 1973; Laurence, 1967; Locke and Locke, 1971; Steinmetz, and Battig, 1969; Vaughan, 1968). Further when more than one category is used, recall is also better for related items if they are blocked in presentation (Cole, Krankel, and Sharp, 1971; Mosly and Shapiro, 1971).

Generally speaking, there is a positive correlation between measures of organisation and the number of words recalled. A number of writers (e.g., Mandler, 1967; Tulving, 1968) have suggested that recall is dependant upon organisation of stimulus materials. Probably the best empirical evidence in support of such position is the study of alphabetic organization (Tulving, 1962). Tulving and others have noted that clustering of items was related to acquisition (e.g., Bousfield, 1953; Bousfield and Bousfield, 1966; Mandler and Dean, 1969; Shuell, 1969). An extensive body of evidence has accumulated which shows that organization, that is, the relation among items, plays an important part in memory for related as well as unrelated words.

Much of the research on organisation in free recall has concerned with the determination of the variables and conditions which influence the amount of clustering obtained. For instance, the effect of varying

numbers of categories appears to be dependent, at least in part, on the length of list and on whether or not recall is cued (Dallett, 1964; Tulving and Pearlstone, 1966). Lauer and his colleagues (1976) found that alphabetic cues fascilitates free recall learning. There was general superiority of cued over uncued retention. The noncued conditions were able to increase their scores when retested under cued conditions (Tulving & Pearlstone, 1966). Bilodeau, Fox, and Blick (1963) have also investigated the effects of retrieval cues or, in their terms, reminders on recall. They found better recall when appropriate cues are provided. The cues make the items accessible. Tulving argued that the cues were effective in bringing about retrieval because they supplied the plan by which they had been stored. In subsequent study, Tulving and Osler (1968) have observed that cues are only effective if they are present at both input and output phases of the task. Provision of the cue under only input or output is detrimental because recall under these conditions is worse than when no cues at all are given. In general, the relationship between recall and number of categories appears to be a direct one when cued recall is used and an inverse one when noncued recall is used. Earhard (1967) indicated that at least for cued recall the use of categorised list is effective only when the number of words per category is fewer than six or seven items.

Several studies (Bousfield, Berkowitz, and Whitmarsh, 1959; Marshall, 1967; Robinson, 1966; Shuell, 1968) employing the alternative study recall procedure have shown that clustering, mean recall, and the mean number of categories recalled increases progressively as a function of trials. In a series of studies, Cofer and his associates (Cofer, 1967; Cofer et al., 1966; Gonzales and Cofer, 1959) have investigated changes in clustering and recall from an immediate-recall test to a second recall test 9 minutes later. In general, there was an increase in clustering and a decrease in recall. The clustering obtained on the second test is significantly greater than the clustering obtained in a control group which waited an equivalent amount of time but did not have the interpolated recall test (Cofer et al., 1966). They found that recall performance is better if it is followed by an immediate test, and if the presentation rates are slower. Similarly, Cohen and his colleagues (1957) reported that immediate recall and slower presentation rates produced more clustering.

It has also been observed that higher recall occured under blocked presentation. Blocked presentation refers to the experimental situation in which all members of a category are presented contiguously in the stimulus list, for example, all the examples of one category are presented before those of another category are presented.

Blocked presentation is considered to be more effective than random presentation for helping the subject perceive the categorized nature of the list. Dallett (1964) obtained both superior recall and superior clustering with blocked presentation. Thus, blocked presentation appears to facilitate both clustering and recall. However, the facilitation for clustering may be partly due to the fact that all members of certain categories appear in the most favourable positions, that is, the first and last serial positions with the terminal items tending to be recalled first (Postman & Keppel, 1968; Shuell & Keppel, 1968). A consistent finding in human memory is that items which are in some way distinctive are more easily remembered (cf. Ellis, 1973; Hunt & Mitchell, 1978; Eysenck, 1979; Nelson, 1979; Hunt & Elliott, 1980; Hunt & Mitchell, 1982)..

There is growing evidence that information is encoded more effectively if it is processed actively and effortfully and involves reorganisation of the materials (cf. Ellis et al., 1974; Ellis et al., 1975; Jacoby, 1978; Slamecka & Graf, 1978; Tyler et al., 1979). Most recently, Ellis and Franklin (1989) have examined the effects of having both a semantic and a superficial perceptual category for organizing lists of words in free recall, and also examined the effect of a personality variable- locus of control - on the susceptibility to superficial features.

When given an option to encode both semantic and superficial features, subjects with an external locus of control encoded the superficial features more extensively than internals, in addition, with this option externals showed poorer free recall. When only semantic cues were presented, no differences in recall or clustering occurred between internals and externals. They also found that the greater the degree of semantic organization, the better was list recall, in contrast, higher levels of superficial organization were related to decreased recall. The degree of externality was positively related to superficial colour clustering and negatively to semantic clustering and recall. Finally, where there was opportunity to process the word lists superficially the recall of externals was substantially diminished but not so for the internals. Thus, Ellis and Franklin (1983) emphasized that under ordinary free recall instructions in which the opportunity to organize lists semantically or superficially is equally present for internals and externals, the externals are much more susceptible to superficial organization and show significantly less recall.

However, there may be an alternative explanation for the results obtained by Ellis and Franklin. It may be possible that subjects with an external locus of control were inefficient in the use of effortful processes

such as organization and consequently they organised the list using the less effective perceptual features. It is established by several investigators that inefficient use of effortful learning processes is related to cognitive rigidity (Tyler, Hertel, McCallum, and Ellis, 1979; Hasher and Zacks, 1979). It is, therefore, reasonable to assume that findings obtained by Ellis and Franklin may be explained in terms of cognitive rigidity-flexibility. Thus, an important consideration which influenced the thinking of the present investigator to undertake the present research is the presence of considerable body of evidence to suggest that cognitive ridigity-flexibility is a potent determiner of memory and forgetting.

The term rigidity has been used widely to refer to the ways of thinking and behaving which are not responsive enough to change in the demands. It has grown out of experimental studies on phenomena like perseveration and mental inertia (Sheils, 1959).

Rigidity has been defined by different investigators in different ways but resistence to change or the tendency to perseverate in thinking and responses remains the basic features of all the definitions. It is a phenotypical concept that refers to types of behaviours, and results in classifying some behaviours as rigid and others as non-rigid according to whether the behaviours are

perseverative or non-perseverative, flexible or inflexible, stereotyped or variable, and so on. In turn, personswho manifest 'rigid' forms of overt behaviour (brain-injured, fee-bleminded) are labelled as 'rigid' persons.

It is defined as "the inability to change one's set when the objective conditions demand it" (Rokeach, 1948), as "lack of variability of response" (Warner, 1946). But one of the best definition seems to be that given by Cattell (1949) when he described disposition rigidity as "the difficulty with which old established habits may be changed in the presence of new demands". A broad definition of rigidity, somewhat similar to that of Cattell, has been given by Shaie. Shaie (1955) defined rigidity as "a tendency to perseverate and resist conceptual change, to resist the acquisition of new patterns of behaviour and to refuse to relinquish old and established patterns".

Rigidity has been differentiated by some investigators into different types. Cattell (1949) distinguished it into two types; Process rigidity and structural rigidity. The former type of rigidity refers to a tendency for an earlier response to continue, although a change has occured in the stimulus situation; while, the latter type refers to the resistance in an attitude or personality trait to forces which might be expected to change it. That is, the referent in process rigidity is a specific response or

a specific way of acting, whereas, the referent in structural rigidity is a way of thinking or a characteristic of personality.

Kurt Goldstein (1943) identifies two kinds of rigidity called 'Primary' and 'Secondary'. Primary rigidity is independent of an impairment of higher mental processes. It is a basic lack of ability to change from one 'set' to another. That is, primary rigidity refers to the inability of a person to change from one train of thought to another. The secondary rigidity, on the other hand, refers to a preference of making incorrect response to making no response at all by a person who finds himself in a difficult situation. Rigidity here is a secondary phenomena; it is the means to escape from a frustrating situation but this rigidity appears only if the task is too difficult.

Piaget (Mehrabian, 1968, pp. 125-132) has explained rigidity in terms of his cognitive - development theory of personality. The process of adaptation, which is the basic process in his theory, consists of assimilation and accommodation as its components. In assimilation an individuals cognitive structure does not change as a function of experience, but in accommodation his cognitive structure does change. Piaget has also made a sharp distinction among rigid, labile, and flexible cognitive

functionings. The cognitive functioning in a rigid person is dominated by assimilatory tendency. Such a person finds it difficult to change himself and to benefit from new experiences. A labile person, on the other hand, is so much changeable that it is difficult to predict any consistency in his behaviour. A flexible individual responds to new information and new experiences without losing his stability and identity.

A thorough survey of literature on learning and memory reveals that few studies have beenconducted in relation to cognitive rigidity-flexibility. However, Cosden, Ellis and Feency (1979) demonstrated poorer recall of rigid subjects than those of flexible subjects. They also examined the effect of cognitive flexibility in recall with perceptual grouping task, and found that organisational processes involved in their task, were influenced by the individual level of cognitive flexibility. Subjects classified as rigid, on the basis of measures of cognitive flexibility, showed impaired recall. Rigid subjects were found to impose stereotypical representation upon incoming information and refrained from producing an assortment of hypothesis or strategy. Similarly, Hasher and Zacks (1979) suggested that rigidity in information processing is related to the inefficient use of effortful learning processes.

It may be noted that in Ellis and Franklin study, subjects were given the option of organizing information with both semantic and superficial perceptual features (e.g., Colour) of the list and free recall was used as a measure of retention. It has been demonstrated that the recall and clustering depend upon variation in testing conditions (Bransford, Franks, Morris, and Stein, 1979). It is, therefore, reasonable to assume that a different pattern of results would be obtained if a different retention test is used in which colours and categories names may be presented as retrieval cues. As demonstrated by Ellis and Franklin that externals are relatively inefficient in organizational strategy, such ineffectiveness in the external's organizational strategy may be simply due to the particular testing condition used (free recall with no instruction as to how to organize the list). We expect different results if different retention testing procedures are used. Furthermore, with respect to the aforementioned relation between cognitive rigidity flexibility and memory, we hypothesize that rigid subjects would encode the superficial perceptual features of the list more extensively than flexible subjects. Flexible subjects, on the other hand would cluster more by semantic categories than would rigid subjects. It is further expected, based on the first two predictions, rigids would perform more poorely in terms of words recalled than flexible subjects.

Finally we would also explore whether or not individual differences in this personality trait (e.g. cognitive flexibility-rigidity) affects immediate and delayed recall differentially and is there any interactional affect of cognitive flexibility-rigidity and semantic-perceptual features of the list on immediate and delayed recall. The findings of the present study may enhance our understanding about human memory system.

CHAPTER - II

REVIEW OF STUDIES

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In the preceding chapter, it has been pointed out that organisation, i.e., relations between to-be-remembered items, is a potent determiner of retention. Experimental studies of different types of organisation have amply justified this view. In this section we shall review some of the studies that demonstrate the influence of organisational factors on retention.

The first systematic study of the effect of categorical organisation on retention was conducted by Bousfield (1953). He initiated a series of verbal learning experiments using categorical organisation with 60-word list which was composed of 15 instances of each four categories, namely, animals, names, vegetables, and professions (ANVP). The four categories were matched as closely as possible on the basis of frequencies of occurrence per million of words in general. The mean frequencies of occurrence were the same for each category, and the ranges of these frequencies were approximately the same. The exemplars were randomly arranged into the presentation list and shown to the subject with instruction to free recall. The words were presented one by one in random order on slides at the rate of 3-seconds per word, and then 10-minutes recall trial was given in which

subjects were asked to recall as many items as possible. Bousfield observed that words belonging to the same category tended to cluster together in the subject's output. The recall sequences of the subjects indicated a greater-than-chance tendency to group the items in clusters containing members of the same category. The number of repetitions which a subject made in his recall was taken as a measure of clustering. A repetition was counted when a subject recalled two instances of the same category in succession. The number of items clustered together by chance was much smaller than that occurring due to the presence of categorical organisation in the list.

In subsequent study, Bousfield and Cohen (1956) investigated the relationship between clustering and the number of categories in 40-word stimulus-lists. They conducted two separate experiments. A total of 150 students served in Exp.I and 160 subjects in the Exp.II which was a replication of the Exp.I. Three types of stimulus-word lists were employed in Exp.I and subjects were divided into three groups of 50 each so as to make a separate group for each type of stimulus-word list. List I comprised of two categories, namely, 20 male first names and 20 professions. List II comprised of four categories, namely, 10 male first names, 10 professions, 10 animals, and 10 vegetables. List III comprised of

eight categories, namely, 5 male first names, 5 professions, 5 animals, 5 vegetables, 5 countries, 5 flowers, 5 carpentar's tools, and 5 trees. The mean frequency of each category was same in all lists. The words of each list were randomized and projected one by one on a screen at the rate of three-seconds. After the projection of the whole list subjects were asked to write down as many words as they could recall in the order in which the words occurred to them. A total of 10 minutes was given to each subject for recall. This procedure was followed for each of three stimulus-word list. Bousfield and his colleague found positive relationship between the number of categories and recall. Further, categorical intrusions were found consistently more frequent than the irrelevant intrusions.

In Exp.II, these investigators used four types of 40-words stimulus lists. The subjects were divided into four groups so as to make a separate group for each type of stimulus-word list. The subjects in Group I were given the two-category list A; Group II, the two-category list B; Group III, the four-category list; Group IV, the eight-category list. The procedure of the Exp.II was similar with that of Exp.I, except that subjects of Exp.II had previously taken part in another study of clustering. Thus, subjects of Exp.II were sophisticated in the sense

that they had previous experience about the study of clustering. Bousfield and Cohen compared the performances of the subjects of the first experiment with the performance of the subjects of the second experiment. They found that subjects in Exp.II as compared to Exp. I showed general superior recall and general superior clustering. They also reported positive relationship between the number of words recalled and the number of categories of stimulus list for Exp.I and a negative relationship for Exp.II. It was argued that this difference was due to the fact that the subjects of Exp.II has previously been exposed to a study which required the recall of stimulus-words in lists comprising either four or six categories whereas subjects of Exp.I lacked this experience. However, the results of both the experiments showed better clustering beyond chance expectation.

Bousfield's explanation of clustering is not straight-forward but it is somewhat equivalent to the view that subjects remember the category names and simply generate exemplars accordingly. However, they cannot do this in an uncontrolled way because there are usually very few words given out by the subject which did not occur in the presentation list. This suggests that subjects are able to distinguish between category exemplars which did occur in the list from those which did not. Bousfield and Cohen suggested that clustering

proceeds by a mediational process, for instance, if subject had forgotten the item 'dog' but recalls the item 'cat' correctly. They argued that the correct recall of item 'cat' activates the category ANIMAL, which in turn leads him to retrieve the item 'dog'. The direct association between categorical names may also account for categorical clustering. The words belonging to a given category are probably more strongly interassociated than are *non*categorized groups of words, for example, recall of 'cat' may lead to recall of 'dog' by direct association without recourse of mediation via activation of ANIMAL.

Associative organization in recall was first investigated by Jenkins and Russell (1952). They constructed lists for free recall by selecting stimulus-response pairs from the Kent-Rosanoff word list and randomized the order of presentation of all the items in the list so that the pair did not occur together. They used a list of 48-words which consisted of 24 highly associated word pairs such as TABLE-CHAIR, MAN-WOMAN, BLACK-WHITE, HIGH-LOW and so on. The words were randomized and the list was checked to avoid the contiguous appearance of any pair of words in the forward stimulus-response order. The word list was presented to two groups of subjects. First group consisted of 39 students of an introductory class in laboratory psychology while

group secon comprised of 62 students of an advanced class in the psychology of individual differences. These two classes were chosen for independent replication. The subjects were asked to remember the words as many as possible in any order and an immediate recall test was given. The results of the recall test were analyzed for (a) the number of responses, (b) the number of forward association, (c) the number of reverse associations, and (d) the number of arbitrary, non-systematic pairs.

Each occurrence of a stimulus word which was followed immediately by its response word was called a forward association. Each response word which was followed immediately by its stimulus word was called a reverse association. Arbitrary pairs were defined as those instances in which a stimulus word was followed immediately, not by its own response word but by response word of the pair succeeding it (e.g., TABLE - WOMAN MAN-HILL, etc.). Jenkins and Russell found that the average number of words recalled by each subject was 24 and more than 50 per cent of these words were recalled in associated pairs. Both groups showed a highly significant tendency to recall the kent-Rosanoff pairs togethers and in the stimulus-response sequence. Reversed associations (recall in the response-stimulus sequence), occurred significantly more than chance pairings but significantly less than the forward sequence (recall in

the stimulus-response sequence). However, both forward and reverse associations occurred significantly more frequently than arbitrary associations. In this way, a high degree of associative organisation was observed by Jenkins and Russell in recall protocols. Jenkins and Russell did not use a control group in this experiment. This shortcoming was, however, overcome in later studies conducted by the same authors. In one such study, Jenkins, Mink and Russell (1958) systematically varied the strength of the relationship between word pairs in a list. Four groups of subjects were given different lists of Kent-Rosanoff stimuli and their primary responses from word-association norms. The response communality for the pairs in list I was 71%, that is 71% of the subjects in a free association task made the same response when the stimulus word was presented - these were highly related word pairs such as MAN-WOMAN, SLOW-FAST and HIGH-LOW and so on. While response communality of lists, II, III and IV were 47%, 30%, and 14% respectively. The pairs of Kent-Rosanoff stimuli and primary responses were randomly arranged in each list and were presented at a 1-second rate. Jenkins et al.(1958) found that recall of the four lists depended upon the strength of the associative relationship between word pairs. The average numbers of words recalled were 19, 18, 17, and 14 for different strength of word-pair lists, respectively.

Thus, it was concluded that associative organization facilitates recall. Associative clustering, the tendency to recall the two members of each pair in succession, also increased with higher interpair associative strength.

The method, used by Jenkins and Russell for assessing the associative strength of pairs, measured intrapair associative strength of each pair and ignored the possibility that words indifferent pairs might have inter-pair associative strengths, for example, LOUD-SOFT and PIANO-NOISE may have not only strong intra-pair association but may also have strong inter-pair association. Thus, it is possible that recalling the LOUD-SOFT pair may help in recalling PIANO-NOISE pair. This argument was expressed strongly by Deese (e.g., Deese, 1959,1961; 1965). Deese calculated an index of Associative Strength which provides an indication of the associative strengths between all words in the list.

Deese constructed 18 different lists of 15 words each and computed their inter-item associative strength. Associative frequencies were obtained from a sample of 50 subjects. A different group of 48 subjects then studied and recalled each list. The obtained recall scores highly correlated with the index of interitem associative strength (r = .88). The more the items of a list tended to elicit each other, the better was recall of the list. Deese also reported that the stronger the

interitem associations were, the fewer recall intrusions occurred ($r = -.48$). He found that the number of items recalled increased as the index increased, and the two measures were more closely related than recall and the interpair measure of associative strength.

Similarly, Cohen, Bousfield, and Whitmarsh (1957) compiled normative data of 400 subjects for the frequency of occurrence of items in response to 43 specific categories (e.g., FISH, SHIP, INSECT etc.). The subjects were asked to write down the first four specific instances they could think of for each category. The responses for each category were then tabulated accordingly to the frequency with which they occurred. For example, TROUT, BASS, and PERCH were the three most frequent responses in the FISH category, with frequencies of 174, 124, and 101, respectively. TURTLE, SOLE, and CLAM were examples of low frequent responses of this category. Using these taxonomic norms, Bousfield, Cohen, and Whitmarsh (1958) obtained lists of words with high- and low-frequencies of taxonomic occurrence. They used these norms to investigate category clustering and compared a highly organized list containing 15 frequent responses in each of four categories with those of low organization list containing 15 infrequent responses in each of the four categories. For instance, the item 'DOCTOR' is an example of a strong associate and 'DITCHDIGGER' is an example of weak associate

in the norms to the category, PROFESSION. These words were presented in random order. It was found that recall of highly organized list was better, and clustering was more pronounced than words of low organised list. Thus it appears that high frequency category members are recalled better and clustered more than low frequency category members.

More or less the same results were also found by Cofer, Bruce, and Reicher (1966). They performed three experiments. Experiment I compared block and random presentation for lists composed of high- and low-frequency associates, and investigated delayed recall with and without an immediate recall. Exp.II was a pilot study of the effect of exposure intervals, and employed a 1-second and a 3-seconds exposure duration for high-frequency associates which were randomly presented. Exp.III compared block and random presentations for lists composed of high- and low-frequency associates. This experiment partially replicated Exp.I, and also employed three intervals (1-2- and 4-second) for all conditions and thus it replicated and extended Exp.II. Using the Cohen et al.(1957) taxonomic norms as base, these investigators selected high- and low-frequency words to form categorised lists. Two basic lists of 40-words each for the three experiments were used. One high-frequency (HF) list composed of 10 highest frequency associates from each

of the four categories such as names of occupations, weapons, four legged animals, and articles of clothing, was used. While low-frequency (LF) list was composed of 10 low-frequency associates from each of the same four categories. The frequency range for HF list was from 16 to 389 occurrences and for the LF list was from 1 to 10 occurrences in the Connecticut norms. List were presented either blocked so that all instances of a category occurred consecutively or non-blocked so that the instances of all categories were in a mixed order. In blocked presentation, all the items from one category occurred first, then all from another, and so on. For randomised presentation, a randomised sequence was obtained from a table of random numbers and this sequence was used for the presentation of list members.

In all experiments subjects were shown a long list of words and asked to recall as many words as they could in any order. In all groups, except for the four delayed recall only groups in Exp.I, subjects recalled the list as soon as its single presentation was completed (immediate recall), having a 5-minutes interval (filled with a word-rating task in Exp.I and II and with a word-classification task in Exp.III), after which there was a second written recall test again of 5-minutes duration (delayed recall). In the four delayed recall only groups of Exp.I, the immediate recall was omitted, and as soon

as list presentation was completed, the subjects were engaged in word rating task. They worked on it for 10.5 minutes and then recalled the list. In this way a test of free recall was given either immediately or following a delay of about 10-minutes. The results indicated that clustering was higher with block presentation for both high-and low-frequency lists than with random presentation, though clustering was found slightly higher for high-frequency items. Word recall was also found higher under block presentation but only for high frequency list. It is, therefore, concluded that clustering and word recall increased with block presentation and when high frequency list was used. Cofer et al.(1966) also found that recall improved and clustering increased when the subjects were given more time to study each item. Moreover, immediate recall and slower presentation rates produced more clustering and better word recall.

Similarly, Dallett (1964) conducted five experiments to examine the effects of number of categories with blocked and randomised lists in free recall. Exp. I explored recall as a function of number of categories (1,2,3,4, and 6) in a 12 items "blocked" list, in which all members within a given category were contiguous. Exp.II examined the same range of categories in a 12 item randomised list. Dallett found superior recall and superior clustering with blocked lists than with

randomized lists. Since performance of the subjects was found generally superior with blocked lists and worse with randomized lists, Exp.III was designed to see whether the findings of Exp.I and II could be dublicated when subjects had before them a list of the categories to aid in category identification during presentation, and as an aid to category recall while they were recalling the items. This extra information improved performance in the 6-category condition, but not in the 2- or 4- category conditions. Finally, Exp.IV and V were designed to explore the effects of number of categories (2,4,6,8 and 12) in 24-word lists. Exp.IV and V yielded decreasing recall as a function of number of categories.

The overall results indicated superior recall and better clustering with blocked lists than with random lists. Clustering was found to be maximal with blocked list when number of categories were four, for both lengths of list. This maximum clustering is probably largely responsible for the fact that the effects of the order variable are most apparent with an intermediate number of categories. Thus, it appears that clustering in recall is markedly affected by whether or not the list is presented in blocked and random order. Furthermore, clustering was not affected by ordering at an intermediate level of number of categories in both 12-word and 24-word list.

The studies reviewed in the preceding paragraphs clearly demonstrated the organized nature of free recall. These studies employed materials which were categorically or associatively related. However, there is considerable body of evidence (e.g. Tulving, 1962; Bousfield, Puff, and Cowan, 1964) for clustering in the recall of lists containing seemingly unrelated words, even when experimenter has intentionally thwarted the presence of an organizational base within the list. Stimulus list is comprised of unrelated words, that is, a random sample of words in which the experimenter has made no attempt to include words which are categorically or associatively related. The subject is more or less free to organize the words in any way he wishes. The subject may impose his own organization upon input material which is not organized in learning and hence may improve his recall. Such type of subjective organization was studied by Tulving (1962) who found that subjective organization occurs even in the learning of a list of unrelated words. Tulving assumed that organization is reflected by the occurrences of the same sequences of items in recall on successive trials. He used a list of sixteen words which were not related to each other in meaning. The list was presented at a 1-second rate per word in different serial orders on each of sixteen trials. After each trial, a 90-seconds recall period was given, during which subject

subject write down as many words as he could recall in any order. Tulving found that the number of items recalled increased over trials. Furthermore, the amount of subjective organization as measured by an index based on the repetition of sequences from trial to trial, also increased over trials. He also observed that the subject was imposing his own organization to aid recall. The particular organization adopted by different subjects was found to be similar. Thus, it appears that organization was inherent in the materials presented, and the subjects discovered rather than created the subjective organization.

Similarly, Tulving (1966) performed some interesting experiments in order to demonstrate that one learns to recall because material is organized subjectively. In one of his experiment, two groups of 12 subjects were asked to learn the same list of 22 nouns. These two groups differed only with respect to the treatment which they received immediately before the learning of the experimental words. The experimental group which had prior experiences were shown experimental list consisting 22 nouns. The list was shown 6 times on a memory drum and the subjects were asked to read the words as they appeared on the drum. While control group subjects, who had no prior experience, read a list of 22 nouns for the same number of trials. Free recall performance was found

identical for the two groups of subjects. On the first trial the mean recall score of prior-experience group was 10.4 while mean recall score of no prior-experience group was 9.2 and the difference between these two means was found insignificant. Though statistically insignificant, prior-experience group had a little advantage over the no-prior-experience group in mean number of words recalled on first trial but from the second trial no difference in the performance of these two groups was found. It is, thus, evident from the above result that mere repetition does not facilitate free recall learning when well-integrated items are used.

Tulving in his another experiment demonstrated that inappropriate organization can even inhibit learning performance. He used two groups, each group comprised of 24 subjects. The two groups of subjects were given a list of 9-words to recall. After learning the 9-word list, all subjects were given 12-learning trials with a second list of 18-words. In one condition the second list was composed of new words. While in the other condition the second list comprised of 9 words already learned which were randomly mixed with 9 new words. Thus, in this group subjects had 12 free-recall trials with half of the list at the beginni ng of learning of the final list. It was found that prior learning of a part

of the list of unrelated words had little facilitating effect on the learning of the whole list. The part-learning group showed superior recall upto the 7 trials but after 7 trials the subjects who learned a completely new list surpassed the former group. The results revealed that inappropriate organisation interfere with the learning. Tulving argued that the subjects who already learned half part of the list were unwilling to modify non-optimal subjective units acquired during part-learning and thus this inappropriate organisation inhibited learning performance.

However, Mandler and Pearlstone (1966) conducted an experiment which showed the importance of subjective organisation for free recall. The purpose of their study was to study free Vs constrained conceptualization. All subjects were given a deck of 52 cards on which word was printed. They were asked to sort these cards into 2 to 7 categories according to any system they wished. They were also told that they would be given sorting trials with the same deck of cards until they achieved a stable organisation, that is, until they sorted the cards in the same way twice in a row. This system of sorting card was called free concept-utilization task by Mandler and Pearlstone in which subjects could use any basis for sorting the cards but some stable system had

to be achieved, e.g., sorting the cards in the same way twice in a row. On the other hand, second group of subjects was given a constrained conceptualization task in which subjects were required to sort the 52 cards according to an experimenter defined scheme. But each subject of this group was yoked with a free subject in order to equate the difficulty of the sortings made by the free and constrained groups. After reaching the criterion of two identical sortings, each subject of both groups was asked to recall as many words as possible which they had just sorted.

Mandler and Pearlstone found that though the free subjects needed fewer trials to reach a stable sorting than the constrained subjects but subjects of the both groups recalled an equal number of words. So there was no difference in the recall performance of the subjects of two groups. The constrained subjects took twice trials to reach at stable organization, i.e., sorting the cards in exactly the same way twice in a row. Thus constrained subjects had twice as many sorting trials and hence twice as many opportunities to learn the list, but they were able to recall only 20 words just as the free subjects. It is, therefore, not the number of learning trials which is most important for free recall but the level of organization which is achieved on these trials. Subjects of the both groups reached the same sorting

criterion and hence their recall performance was identical, although one of the group needed twice as many trials to reach criterion than the other.

The review of the above studies clearly demonstrated that 'organisation' is an important determiner of retention. There is, however, substantial body of evidence to suggest that like organisation, 'retrieval cues' also have facilitative effect on retention. In the following paragraphs we will review some of the important studies that bear directly or indirectly on this issue.

A current emphasis in human memory research is on the processes by which to-be-remembered materials are stored and retrieved. Although the experimental and theoretical approaches to these problems are rather diverse, one frequently used method has been the cued-recall paradigm. It has been established by several investigators that retrieval cues or reminders, especially if they are put into memory along with the to-be-remembered events, are important aids to memory (Tulving & Pearlstone, 1966; Tulving & Osler, 1968; Thomson & Tulving, 1970; Tulving and Thomson, 1973; Lauer and Sroby 1976). Retrieval cues have been shown to enhance recall performance when presented at input along with the to-be-remembered words in a list of unrelated words and provided as retrieval cues at output.

Tulving says that the cues are effective in bringing about retrieval because they supply the plan by which they are to be stored. Thus, it appears that retrieval cues greatly facilitate recall performance. However, retrieval cues are effective only if they are present at both input and output phases of the task. Provision of the cue under only input or output has detrimental effect on retention; recall under these conditions is worse than when no cues at all are given (Tulving & Osler, 1968).

Tulving performed a series of experiments to test the conditions under which retrieval cues are effective in aiding recall. In first of these, Tulving and his colleague (Tulving & Pearlstone, 1966) constructed lists of 12, 24 and 48 words containing categories of one, two, and four words in each. In this way they varied the number and size of the categories presented to different groups of subjects. Items in each category were grouped together and each group of items was preceded by its category name. The lists were read to subjects and the subjects were told to memorize the words, except for the category names which did not need to be memorized. For the recall test, half of the subjects were asked to write as many words as they could remember on a blank sheet of paper, while the other half of the subjects were given a recall sheet with all of the category names printed on it. After that a second recall attempt was made in which

were tested under these output conditions. They were given practice list prior to the experimental lists which consisted of 24 proper nouns such as names of oceans, rivers, countries, cities, and politicians. After that the 24 TBR words were shown on a TV screen at the rate of 2 seconds per word and subjects were asked to recall in recall booklets. The subjects were given 5 minutes for recording the recall. It was found that the presence of strong cues at output facilitated retrieval of TBR words, both under the condition where TBR words alone were shown in the input list and the condition where the cues accompained TBR words at input. Weak cues presented at output also facilitated retrieval of TBR words, provided that the same cues had accompained TBR words at input. But weak cues presented at output did not facilitate recall of TBR words when they had not been presented at input. Finally, the results of Exp.I revealed that strong associative cues present at output facilitated recall of TBR words even when the TBR words had been accompained by different weak cues at input, but this facilitative effect was smaller than the facilitative effect of strong cues at output following no cues or strong cues at input.

The last finding contradicts the respective merits of the encoding specificity and associative continuity hypotheses. The strict interpretation of the encoding specificity says that recall under cond. W-S should not have been higher than under cond. W-O. Similarly, the strict interpretation of associative continuity hypothesis says that recall under cond. W-S should have been as high as in cond. O-S. The results of Thomson and Tulving's Exp. I clearly do not favour these positions but this pattern of results lie somewhere between the two extremes predicted from two points of view. That is why Thomson and Tulving conducted Exp.II to verify encoding specificity hypothesis. In this experiment subjects were tested with four successive lists, each containing 24 TBR words. The two lists of 24 TBR words and their corresponding cue words constructed for Exp.I were used as lists 3 and 4 where as two additional lists of 24 words and weak cues were prepared from two sets of free associative norms (Bilodeau & Howell, 1963; Riegel, 1963) to serve as lists 1 and 2 in this experiment. Each list was presented once. Each TBR words and each cue-TBR word pair was presented at the rate of 3 seconds on a closed-circuit TV screen. TBR word was either occuring alone (Input cond.O) or accompanied by a weakly associated cue word (Input cond.W). Recall of TBR words was tested either in absence of any cues (Output cond.O),

or,in presence of weakly associated cues (Output cond.W), or in presence of strongly associated cue words (Output cond.S). Three minutes were given to subjects for written recall test on each list. Subjects were asked to record their responses in booklets. In this way the procedure of Exp.II was identical with that of Exp.I with respect of each important features except that (a) no practice list was given and (b) each subject was tested with four successive lists. Thomson and his colleague found that strong cues facilitated recall under conditions where no cues were given at recall test and subjects were left free to subjectively encode the TBR words. However, identical strong cues completely failed to facilitate recall when the TBR words were presumably encoded specifically with respect to their accompanying weak cues.

The results of the Exp.II seems to be consistent with the implications of the encoding specificity hypothesis, and inconsistent with the associative continuity hypothesis. It might be argued that strong cues failed to facilitate recall in the W-S conditions in Exp.II for reasons other than encoding specificity. For example, it could be assumed that subjects in the W-W conditions developed a set to respond to retrieval cues with weak associates. If this set persisted when strong cues were provided in the critical W-S conditions, subjects could not have responded with strong associates

of these cues as correct TBR words. This confusion prevented them from taking maximum advantage of stored information about TBR words at the time of recall test. Thomson & his colleague, therefore, conducted Exp.XII to get rid of this confusion in which they used a mixed list paradigm. The two lists of 24 words previously used in Exp.I constituted the two sets of list 3 in this experiment. Four other lists of 24 TBR words and cues were prepared from the association norms (Bilodeau & Howell, 1965; Riegel, 1965) to serve as the first two lists. Each list contained 24 TBR words, one half of them accompanied by weak cues and the other half by strong cues, both at input and test. The subjects were shown a short practice list of four TBR words before the three experimental lists were presented. Each cue-TBR word was presented on the closed-circuit TV screen for 3 seconds. In presentation of list 3, half of the cues appeared with the TBR words in the input list and half were new but related words. The two types of cues were identified for subjects by being presented on colcumns headed "old" and "new". The subjects were given as much time as they wanted for the written recall test but they took not more than 3 minutes for recall. The overall pattern of results clearly revealed that strong cues at output produced a sizable facilitation in recall when no cue at input was given (cond.O-S). But strong cues presented at recall in cond. W-S were not effective in

facilitating recall performance, i.e.,strong cues present at output with weak cues at input produced striking loss in recall. These results favoured the encoding specificity hypothesis; when subjects were induced to encode TBR words with respect to weak cues at input, strong cues introduced at output failed to facilitate recall and thus these results rules out the associative continuity hypothesis.

In a similar study, Lauer and his colleague (1976) examined the effects of alphabetic organization on the acquisition and delayed retention of semantically similar words. They constructed three 20-name learning lists having 5,10, and 20 different initial letters from the Battig-Montague (1969) taxonomical category of girl's first name. For the 5-letter list, there were 5 names beginning with each of 5 letters such as B, D, J, L, and S. The 10-letter list had 2 names beginning with each of these 5 letters plus letters C, G, H, M, and P. These 10 letters along with 10 other letters like A, E, F, I, K, N, R, T, V, and W were each used for 1 name in the 20-letter list. The mean taxonomic frequencies of the 5-, 10- and 20 letter lists were 39.60, 40.20, and 40.60, respectively. All names were closely comparable in length ranging from five to seven letters. These lists of 20 girl's first name having either 5, 10, or 20 different initial letters were presented to the

subjects. They were presented to the criterion of 18/20 correct, either with or without first letter cues. All subjects were tested for 1 wk. delayed recall with alphabetic cues present or absent for half of each group. Both simultaneous and successive presentation were used for all the three lists having 5-, 10-, and 20-letter. In successive presentation of cued learning, the capitalized first letter of the name was presented in the upper left corner of the slide, and all names with the same initial letter were presented contiguously. But in uncued learning, names appeared without such cues. In simultaneous uncued presentation, all 20 names were presented in capitals on a single 2x2 slide in two 10-names columns. While for the 20-letters cued list, the initial letters were typed in capitals to the immediate left of the name. For recall tests, all cued learning subjects were given a sheet with initial letters in alphabetical order and an appropriate number of blank lines to the right of each letter. Uncued subjects were given no letter cues either during recall or list presentation. They were given sheet containing only 20 numbered blank lines. These cued and uncued recall sheets were also used for 1 wk. delayed recall tests. These subjects were tested after 1 wk. of original learning for cued or uncued retention instructions followed by two 1-minute written recall test. Lauer and his colleague found that

cued learning conditions produced significantly better recall performance than uncued condition. Further, uncued learning led to much better delayed recall than cued learning. The overall results clearly revealed facilitative effects of alphabetical cues and blocking on the acquisition of a list of semantically similar words and the subsequent retardation of delayed retention following cued learning conditions.

Despite the marked advantages of alphabetical cues and blocking for original learning, uncued original learning produced more effective and deeper processing which resulted in superior delayed retention. Alphabetic cues facilitated delayed recall only if they were present at the time of the retention test irrespective of whether or not they had ever been presented before.

More recently, Ellis and Franklin (1983) examined the effects of having both a semantic and a superficial perceptual category for organizing lists of words in immediate and delayed recall, and also examined the effects of a personality variable, locus of control, on susceptibility to superficial features. They conducted two experiments to varify these issues. The first issue was examined in Exp.I and both issues were examined in Exp.II. In Exp.I, all the 73 subjects were shown a randomised list of 16 familiar nouns, four were names of professions, four were names of types of buildings,

four were types of food, and four were variation of animals, with instructions to remember the words as best as they were able. The list was shown at the rate of 3 second per word for four presentation. Half of them were given an immediate test of free recall whereas remaining half were tested after a 10-minute delay interval.

Three treatment conditions and an immediate versus delayed retention test were employed. The three conditions consisted of an experimental group and two control groups. In the experimental condition, the subjects were shown the list of 16 words colour-blocked; i.e., the first four words in the list were presented over a red back ground, the next four over a green background, the next four over a yellow background. On the other hand, the control subjects were shown the same word list as did the experimental subjects with one change, i.e. these subjects were shown the word list with a single colour background. For example, one fourth of the control subjects were shown words with a red background, one fourth over a green background, one fourth over a yellow background, and one fourth over a blue background. This control condition allowed for clustering by semantic categories but did not allow for clustering by colour whereas the experimental condition allowed for both options. The

second control group was introduced to control the distinctiveness effect by presenting most of the items over a single colour background. Each subject was asked to recall as many words in writing as possible. Ellis and Franklin found no reliable difference among groups under the immediate recall condition but experimental subjects showed poorer recall as compared to control subjects in delayed recall. Similarly, they found no difference among groups in semantic clustering during immediate recall. But semantic clustering by experimental subjects was also found poorer than that of control subjects. Further, experimental subjects overall clustered more by colour than control subjects, however there was no significant difference between these two groups. The greater influence of superficial encoding at immediate than at delayed recall suggests that clustering by colour is a relatively transitory phenomenon.

In Exp.I, Ellis and Franklin found ceiling effect in immediate free recall arising from the brevity of the list and the frequency with which it was presented. Therefore, the list was lengthened in Exp.II from 16 to 24 words and the frequency of presentation reduced from four to three presentation. The Exp. II was designed to investigate the role of locus of control predisposition in processing information and also examined the

effects of having both a semantic and a superficial perceptual category for organizing lists of words in free recall. Subjects were randomly assigned to either the experimental or control condition by drawing half the subjects for each condition from the internal pool and half from the external pool. The procedure for presentation and testing was the same as for Exp.I except that presentation frequency was reduced from four to three trials, and control conditions II was eliminated since no difference was found between two control groups. When given an option to encode both semantic and superficial features, subjects with an external locus of control encoded the superficial features more extensively than internals, in addition with this option externals showed poorer free recall. When only semantic cues were presented, no difference in recall or clustering occurred between internals and externals. They also found that the greater the degree of semantic organization the better was list recall while higher level of superficial organisation was related to decreased recall. The degree of externality was positively related to superficial colour clustering and negatively to semantic clustering and recall. Finally, where there was opportunity to process the word lists, superficially, the recall of externals was substantially diminished but not so far the internals. Thus Ellis and Franklin (1983) emphasized

that under ordinary free recall instructions in which the opportunity to organize lists semantically or superficially is equally present for internals and externals, the externals are much more susceptible to superficial organization and show significantly less recall.

An important consideration which influenced the thinking of the present investigator to undertake the present research is the considerable body of evidence to suggest that cognitive flexibility-rigidity is a potent determiner of retention. Although researchers have been very active concerning possible factors in rigidity, and efforts have been made to relate rigidity with anxiety, education, sex, caste, economic status, motivation, and goal setting behaviour, there are few experimental works available relating rigidity to conditions of learning, retention and recall. Moreover, a thorough survey of literature revealed that there is no adequate experimental work that may demonstrate the importance of flexibility rigidity in organisational processes and retention. However, we shall review some of the studies in following paragraphs which bear directly or indirectly with the problem of the present study.

In a study on selected personality variables and learning processes, Gaier (1952) showed that there was a positive correlation between high rigidity and rote learning. After a long gap, Akhtar et al. (1972)

conducted an experiment on personality rigidity and incidental learning. They found that rigidity is negatively associated with incidental learning. They further reported that female subjects are more rigid than their male counterparts. In a similar study, Iman (1975) also found that rigidity has negative influence on incidental learning. Khan (1975) studied the effect of motivation on retention under condition of interference in relation to rigidity. In this study he attempted to determine the extent to which motivational variable can resist inhibitory effect of interpolated activity in a typical retroactive inhibition conditions and also related the resistance to RI with degree of rigidity which the individual brings to the learning situation. He found that rigid subjects recall better than non-rigid subjects, though the difference was not found a significant. He also reported that rigid subjects show greater resistence in maintaining the originally established habit in a typical RI condition.

Somewhat recently, Cosdon, Ellis and Feency (1979) demonstrated poorer recall of rigid subjects than those of flexible subjects. They also examined the effect of cognitive flexibility in recall with perceptual grouping tasks, and found that organisational processes involved in their task, were influenced by the individual level of cognitive flexibility. Subjects classified as rigid,

on the basis of measures of cognitive flexibility-rigidity showed impaired recall. Rigid subjects were found to impose stereotypical representation upon incoming information and refrained from producing an assortment of hypothesis or strategy. Similarly, Hasher and Zacks (1979) suggested that rigidity in information processing is related to the inefficient use of effortful learning processes.

Most recently, Chhaya (1985) examined the effects of rigidity-flexibility and sex of the subjects on Zeigarnik Effect, i.e., predominance of the recall of unfinished tasks. In this experiment she administered Rigidity-Flexibility Test (Ansari- Bhargava, 1958) on 200 undergraduate students of both sexes. She formed two extreme groups of rigid and flexible persons on the basis of score obtained by them on RFT. The experiment was done individually. All the subjects were asked to perform eighteen tasks (six verbal, six numerical, and six performance). Interruption was introduced when the subject was about halfway through the task. The recall test was taken five minutes after finishing the tasks. She found rigidity-flexibility has strong effect on Zeigarnik Quotent. That is, the tendency to recall interupted task was greater in rigid persons than the

flexible one. She also found a non-symmetric but significant interactional effect between rigidity-flexible and sex of the subject in relation to Zeigarnik Effect.

AIM AND IMPORTANCE OF THE PRESENT RESEARCH

As stated in chapter-I also in their study Ellis and Franklin (1983) provided their subjects the option of organising information with both semantic and superficial perceptual features (e.g., colour) of the list and free recall was used as a measure of retention. It has been demonstrated that the recall and clustering depend upon variation in testing conditions (Bransford, Franks, Morris, and Stein, 1979). It is, therefore, resonable to assume that a different pattern of results would be obtained if a different retention test is used in which colours and categories names may be presented as retrieval cues. As demonstrated by Ellis and Franklin that externals were relatively inefficient in organisational strategy, such ineffectiveness of the externals' organizational strategy may be simply due to the particular testing condition used (Free recall with no instruction as to how to organise the list). We expect different retention testing procedures are used.

Furthermore, with respect to the aforementioned relation between cognitive rigidity-flexibility and memory, we hypothesize that rigid subjects would encode

the superficial perceptual features of the list more extensively than flexible subjects. Flexible subjects, on the other hand, would cluster more by semantic categories than would rigid subjects. It is further expected, based on the first two predictions, rigids would perform more poorely in terms of words recalled than flexible subjects.

Finally we would also explore whether or not individual differences in this personality trait (e.g., cognitive flexibility rigidity) affects immediate and delayed recall differentially and is there any interactional effect of cognitive flexibility-rigidity and semantic-perceptual features of the list on immediate and delayed cued recall. The findings of the present study may enhance our understanding about human memory system.

CHAPTER - III

METHOD AND PROCEDURE

CHAPTER - XXI

METHOD AND PROCEDURE

As mentioned in the preceeding chapters the present research was designed to study superficial and semantic organisation in immediate and delayed cued recall in relation to cognitive flexibility-rigidity. More specifically, the present investigation was undertaken to answer the following questions:

(i) Does cognitive rigidity-flexibility have differential effect on superficial and semantic organisation of the material in immediate cued recall ?

(ii) Does cognitive rigidity-flexibility have differential effect on superficial and semantic organization of the material in delayed cued recall ?

(iii) Does cognitive rigidity-flexibility have differential effect on immediate cued recall ?

(iv) Does cognitive rigidity-flexibility have differential effect on delayed cued recall ?

(v) Do superficial and semantic organization have differential effect on immediate cued recall ?

(vi) Do superficial and semantic organization have differential effect on delayed cued recall ?

(vii) Do cognitive rigidity and cognitive flexibility have differential effect on immediate and delayed cued recall ?

(viii) Do superficial and semantic organisation have differential effect on immediate and delayed cued recall ?

(ix) Is there any interactional effect of cognitive rigidity-flexibility and type of organisation on immediate and delayed cued recall ?

(x) Is there any interactional effect of cognitive rigidity-flexibility and type of organisation on the difference of immediate and delayed cued recall ?

Experimental Design

To answer the above questions, a factorial design of experiment was used in which four groups of subjects learned a list of 16 words belonging to four categories, namely, animals furnitures, professions, and vehicles, having either a semantic or a superficial perceptual category for organizing lists of words for cued recall. The design of the experiment may be presented diagrammatically as follows.

In order to form four groups of subjects mentioned above, a Hindi version of G-S Rigidity Scale (Ali, 1975) was administered on four hundred undergraduate students of Aligarh Muslim University, randomly selected from the faculties of Arts and Social Sciences. On the basis of scores obtained by them, two extreme groups were formed, namely, rigid and flexible. The students securing a score above Q_3 (i.e. 16) were classified as rigid while those securing a score below Q_1 (i.e. 12) were categorized as flexible. There were 40 subjects in each group. Half of the subjects of each groups served under Experimental Condition and the other half served under control condition. In this way four groups were formed, namely, (1) Rigid experimental group, (2) Rigid control group, (3) Flexible experimental group and (4) Flexible control groups.

In the experimental condition, subjects saw the list of 16 words colour-blocked, ie. the first four words in the list were presented over a red background, the next four over a green background, the next four over a yellow background, and the final four over a blue background. The purpose of this procedure was to provide a superficial, semantically irrelevant basis for encoding (semantic categories), these subjects had an alternative coding option based on the superficial list characteristic of colour. In the control condition, instead of background

of varying colours, the subjects were shown same word list with a single colour background. Thus, these subjects were allowed to cluster by semantic categories but were not allowed to cluster by colour.

The learning and test sequence for each group of subjects was as follows: First a ready signal was given to the subject, then a randomized list of 16 words was presented for four trials by means of electrically operated memory drum. The words were presented one by one, each appearing in the apperture for two seconds at a regular interval of two seconds in between two exposures. Immediately after the fourth presentation, names of the categories or colours were given as cues and subject was asked to write down in any order as many words as they could recall within 3-minutes. In this way, subject was tested for immediate cued recall. After the immediate cued recall test, a retention interval of 10 minutes was given to the subject during which he remained engaged in reading some unrelated light material. This was done to control the rehearsal of the material. At the end of 10 minutes retention interval, names of categories or colours were given as cues and subject was asked to write down in any order as many words as they could recall within 3-minutes. Thus subject was tested for delayed cued recall. For half of the subjects of each group, a randomised colour blocked list of 16 words was presented, i.e. each four

words in the list were presented over different four colour backgrounds, namely, red, green, yellow, and blue and names of the colours were given as cues in immediate as well as delayed recall test. For other half of the subjects, a randomized list of 16 words was presented over a single colour background and names of the categories, e.g., animals, furnitures, professions, and vehicles, were given as cues in immediate as well as in delayed recall test. Thus, it yielded eight observations on four groups of subjects for each of the two measures of the dependent variable employed in the present experiment were immediate and delayed cued recall.

In short, a 2x2 factorial design in which one task variable and one personality variable each varying in two ways, was used in this experiment. The two values of task variable were (a) superficial organization and (b) semantic organization. The personality variable was varied by selecting (a) rigid and (b) flexible subjects. Thus, there were four groups of subjects, namely, rigid with superficial organization, rigid with semantic organization, flexible with superficial organization, and flexible with semantic organization. These four groups of subjects were tested for immediate and delayed cued recall. Thus, there were eight observations on four groups of subjects.

Stimulus Material & Apparatus :

This stimulus material and apparatus employed in the experiment were (a) a randomized categorical and colour-blocked list of 16 words and (b) electrically operated memory drum.

The lists consisted of 16 familiar nouns. Out of 16 words, four were names of four legged animals, four were names of types of furnitures, four were types of professions and four were varieties of vehicles. The words of each list ranged from five to eight letters. These four categories were chosen from Battig and Montague's (1969) categorical norms such that each category contained at least four items which were clearly members of only one of the designated categories. Moreover, each word of the four categories was of equal difficulty. Having selected the words, they were randomized in the following way. Firstly all the 16 words belonging to four categories were written on separate equal size of paper sheets. These sheets of papers were repeatedly shuffled in a box and then were drawn one by one. The original items, thus randomized, occurred in the following serial order to make up the list of stimulus words:

Chair, horse, scooter, elephant, clerk, rickshaw doctor, truck, lawyer, stool, bicyle, tiger, bookcase, engineer, table, and camel.

In this way a randomized categorical list of 16 words was prepared. This list was presented for four trials to the subjects where they had an opportunity to organize the TBR words semantically. But for the superficial organization condition, the same word list was presented over four different colour backgrounds. The first four words in the list were written over a red background, the next four over a green background, the next four over a yellow background, and the final four over a blue background. In this way, a randomized list of 16 words colour-blocked was prepared. The two randomized lists, thus prepared and used in the present experiment, are given below:

Randomized list	Randomized Colour-blocked list	
CHAIR	Red Back-ground	CHAIR
HORSE		HORSE
SCOOTER		SCOOTER
ELEPHANT		ELEPHANT
CLERK	Green Back-ground	CLERK
RICKSHAW		RICKSHAW
DOCTOR		DOCTOR
TRUCK		TRUCK
LAWYER	Yellow Back-ground	LAWYER
STOOL		STOOL
BICYCLE		BICYCLE
TIGER		TIGER
BOOKCASE	Blue Back-ground	BOOKCASE
TABLE		TABLE
CAMEL		CAMEL

The apparatus used inthis experiment was an electrically operated memory drum in which timing device was so adjusted as to allow for each word to be exposed for two seconds at a regular interval of two seconds in between two exposures.

Subjects & Procedure:

In all eighty subjects were used in this experiment. There were four groups, each consisting twenty subjects selected according to the specific requirements of the experimental conditions mentioned under the heading 'Experimental Design'. The subjects were undergraduate students of A. M.U. Aligarh.

All the subjects used in this experiment were tested individually and all the four groups were run simultaneously, i.e. first subject was tested from the first group, second subject was tested from group II, third was tested from group III, fourth subject was tested from group IV, fifth subject was tested from group I and so on. The apparatus, with two randomized lists of 16 words pasted on it, was placed in the research room of the Department of Psychology, A.M.U., Aligarh. As the subject entered the research room, he was seated comfortable on a chair facing the apperture of the memory drum. The following general instructions were given to him for learning and recalling the words of the list.

"I am going to present you a randomised list of few common words one by one through electrically operated memory drum. Each word will appear in the apperture of the memory drum for two seconds at a regular fixed interval of two seconds in between two exposures. In this way the whole list will be presented for four times. You are required to see each word carefully and try to remember as many words as possible in any order. Have you followed"?

According to the instructions given above each subject was tested for immediate as well as for delayed cued recall irrespective of his group assignment.

The data obtained were tabulated groupwise and statistically treated to draw necessary inferences as given in chapter IV.

CHAPTER - IV

ANALYSIS OF DATA, RESULTS AND DISCUSSION

CHAPTER IV

ANALYSIS OF DATA, RESULTS AND DISCUSSION

As mentioned in the preceding chapter, a 2x2 factorial design of experiment was employed in the present study. Two independent variables, i.e., rigidity-flexibility and organization, each varying in two ways, and two measures of the dependent variable, namely, retention (immediate and delayed cued recall) were used. There were four groups of subjects, namely, rigid experimental group, rigid control group, flexible experimental group, and flexible control group. Each of the four groups was tested for immediate and delayed cued recall. Thus there were eight possible observations of the two values of each of the two independent variables for each of the two measures of the dependent variable.

The data were analyzed for clustering by semantic categories (semantic clustering), for clustering by superficial perceptual features (colour clustering) and for word cued recall. t-test and analysis of variance were used to draw necessary inferences.

The raw scores of clustering by colour and semantic clustering obtained by rigid and flexible subjects on immediate and delayed cued recall tests are given in Table 1.

TABLE - I

Showing raw scores of clustering obtained by four groups of subjects on immediate and delayed cued recall.

No.of subjects	RIGID				FLEXIBLE			
	Experimental condition		Control condition		Experimental condition		Control condition	
	Immediate cued recall	Delayed cued recall	Immediate cued recall	Delayed cued recall	Immediate cued recall	Delayed cued recall	Immediate cued recall	Delayed cued recall
1	8	5	11	10	6	6	14	12
2	10	7	12	10	8	7	13	13
3	7	8	10	10	7	6	15	14
4	8	6	12	10	8	5	14	12
5	8	5	12	8	6	6	12	12
6	7	5	10	11	8	4	14	11
7	9	7	11	10	6	5	15	12
8	8	5	13	10	7	4	13	10
9	6	6	10	8	5	5	13	10
10	9	6	12	11	8	6	11	13
Total	80	60	113	98	69	54	137	119

In order to answer the first question, the mean colour clustering scores and the mean semantic clustering scores obtained by rigid and flexible subjects on immediate and delayed cued recall tests were compared by the application of t-test, the summary of which is reported in Tables II, III, IV and V respectively. The mean colour clustering score obtained by rigid and flexible subjects on immediate cued recall, S.D., and t-value are given in Table II.

TABLE -II

Showing mean colour clustering on immediate cued recall, S.D. and t-value.

Subjects	Mean colour clustering	S. D.	t-value	Result
Rigid	8.0	1.15	3.01	$P < .01$
Flexible	6.9	1.10		

Table II shows that the mean colour clustering score (8.0) obtained by rigid subjects is higher than mean colour clustering score (6.9) obtained by flexible subjects. The t-value is 3.06 which is significant at .01 level. It is, therefore, concluded that rigid subjects encode superficial features of the list more extensively than flexible subjects on immediate cued recall test.

Similarly, the mean colour clustering score obtained by rigid and flexible subjects under delayed cued recall condition were also compared. The mean colour clustering scores obtained by rigid and flexible subjects on delayed cued recall, S.D. and t-value are given in Table XIX.

TABLE -XIX

Showing mean colour clustering scores on delayed cued recall, S.D. and t-value

Subjects	Mean colour clustering	S.D.	t-value	Result
Rigid	6.0	0.94	1.99	NS
Flexible	5.4	0.97		

Table XIX reveals that mean colour clustering score (6.0) of rigid subjects is slightly higher than mean colour clustering score (5.4) of flexible subjects. The t-value is 1.99 which is insignificant indicating that there is no reliable difference between mean colour clustering scores obtained by rigid and flexible subjects on delayed cued recall test. We may, therefore, conclude that rigid subjects are much superior in colour clustering than those of flexible subjects on immediate cued recall test but they do not differ significantly under

delayed cued recall condition. This suggests that rigidity is positively related with colour clustering on immediate cued recall test and clustering by colour is relatively a transitory phenomenon.

The mean semantic clustering scores obtained by rigid and flexible subjects on immediate and delayed cued recall tests and their significance of differences are given in Table IV and V respectively.

TABLE - IV

Showing mean semantic clustering scores obtained by rigid and flexible subjects on immediate cued recall, S.D. and t-value

Subjects	Mean semantic clustering	S.D.	t-value	Results
Rigid	11.3	1.06	7.32	$P < .01$
Flexible	13.7	0.93		

We find in Table IV that the mean semantic clustering score (11.3) of rigid subjects is markedly lower than the mean semantic clustering score (13.7) of flexible subjects. The t-value is 7.32 which is significant at .01 level of confidence. The result leads us to conclude that rigid subjects are poorer in semantic clustering than their flexible counterparts. It appears that rigid subjects are intrinsically deficient in semantic processing.

The mean semantic clustering scores obtained by rigid and flexible subjects on delayed cued recall test were also compared. The mean semantic clustering scores, S.D. and t-value are presented in Table V.

TABLE - V

Showing significance of difference between mean semantic scores of rigid and flexible subjects on delayed cued recall test.

Subjects	Mean semantic clustering	S.D.	t-value	Result
Rigid	9.8	1.03	5.83	$P < .01$
Flexible	11.9	1.14		

It is evident from Table V that mean semantic clustering score (9.8) obtained by rigid subjects is much lower than mean semantic clustering score (11.9) obtained by flexible subjects. The t-value is 5.83 which is significant at .01 level. The result clearly demonstrates that rigidity has an adverse effect on semantic clustering on delayed cued recall too.

The overall results reveal that rigid subjects encode superficial perceptual features of the task (i.e. colour clustering) more extensively than their flexible

counterparts on both immediate and delayed cued recall test, though they do not differ significantly on delayed cued recall test. On the contrary, flexible subjects encode semantic categories of the list (i.e. semantic clustering) more extensively than those of rigid subjects on both immediate and delayed cued recall test.

The word recall scores obtained by rigid and flexible subjects on immediate and delayed cued recall test were also analyzed by using 2x2 factorial design. F ratios were calculated separately for immediate and delayed cued recall. F ratio were also calculated for the difference between immediate and delayed cued recall scores with a view to determine the differential effect of each independent variable on immediate and delayed cued recall.

The word recall scores obtained by four groups of subjects, namely, rigid experimental group, rigid control group, flexible experimental group, and flexible control group on immediate cued recall are reported in Table VI(a), their mean recall scores in Table VI(b), and the F ratio in Table VI(c).

TABLE - VI(a)

Showing recall scores obtained by rigid and flexible subjects under experimental and control conditions on immediate cued recall test.

No. of subjects	Rigid		Flexible	
	Experimental condition	Control condition	Experimental condition	Control condition
1	10	13	9	14
2	12	12	12	13
3	9	11	10	15
4	10	12	10	14
5	11	12	11	12
6	8	10	9	14
7	11	12	10	15
8	10	13	10	13
9	9	10	8	13
10	10	13	14	14
Total	100	118	100	137

TABLE - VI(b)

Showing mean recall scores of four groups on immediate cued recall test.

Subjects	Experimental condition	Control condition	Mean
Rigid	10.0	11.80	10.90
Flexible	10.0	13.70	11.85
Mean	10.0	12.75	

TABLE - VI(c)

Showing ANOVA for 2x2 factorial design

Source of variation	Sum of square	df	Mean sum of square	F.ratio	Result
Rigidity/ Flexibility	9.02	1	9.02	7.45	$P < .01$
Type of organisation	75.62	1	75.62	62.49	$P < .01$
Rigidity/ Flexibility x type of organisation	9.03	1	9.03	7.46	$P < .01$
Within groups (Error)	43.70	36	1.21		
Total	137.37	39			

A perusal of Table VI(c) reveals that F ratio for variation in personality variable i.e. rigidity-flexibility is 7.45 which is significant at .01 level of confidence. The result suggests that rigidity and flexibility have differential effect on immediate cued recall. Ignoring type of organisation, we find in Table VI(b) that the mean of means for rigid subjects is 10.9 (i.e. 10.0 + 11.8/2) and the mean of means for flexible subjects is 11.85 (i.e. 10.0 + 13.7/2). Since the mean of means for rigid subjects is lower than the mean of means for flexible subjects, it may be concluded that rigidity has more pronounced adverse effect on immediate cued recall than flexibility. In other words, rigid subjects show poorer immediate cued recall than flexible subjects.

F ratio for organisation variation, as shown in Table VI(c), is 62.49 which is significant at .01 level. The result suggests that type of organisation adopted by the subjects has differential effect on immediate cued recall. Ignoring rigidity-flexibility variable, we find in Table VI(c) that the mean of means with semantic clustering is 12.75 (i.e. 11.8 + 13.7/2) and the mean of means with colour clustering is 10.0 (i.e. 10.0 + 10.0/2). Since the mean of means with semantic clustering is markedly higher than the mean of means with colour

clustering, it may, therefore, be concluded that type of organization adopted by subjects has differential e effect on immediate cued recall. In other words, recall performance with colour clustering is poorer than recall performance with semantic clustering on immediate cued recall. This result leads us to conclude that recall performance is positively related to semantic clustering while negatively related to colour clustering on immediate cued recall test.

F ratio for interaction between rigidity-flexibility and type of organization, as shown in Table VI(c), is 7.46 which is also significant at .01 level of confidence. The result indicates that there is an interactional effect of rigidity-flexibility and type of organization on immediate cued recall. We find in Table VI(b) that the mean recall scores obtained by rigid and flexible subjects are higher with semantic clustering than mean recall scores with colour clustering. Moreover, under experimental condition the recall performance of rigid subjects is equal with that of recall performance of flexible subjects whereas under control condition the recall performance of flexible subjects is superior to the recall performance of rigid subjects (Table VI(b). These results lead us to conclude that there is an interactional effect of rigidity-flexibility and type of organization on immediate cued recall.

The word recall scores obtained by four groups of subjects, namely, rigid experimental group, rigid control group, flexibile experimental group, and flexible control group on delayed cued recall are presented in Table VII(a), their mean recall scores are given in Table VII(b), and F ratio are shown in Table VII(c).

TABLE - VII(a)

Showing recall scores obtained by four groups of subjects on delayed cued recall.

No. of subjects	Rigid		Flexible	
	Experimental condition	Control condition	Experimental condition	Control condition
1	8	10	10	12
2	9	10	11	13
3	11	9	8	14
4	9	10	10	13
5	7	8	10	10
6	7	11	9	13
7	10	10	9	12
8	7	10	8	11
9	8	8	9	11
10	8	11	10	12
Total	84	97	94	121

TABLE - VII(b)

Showing mean recall scores obtained by four groups of subjects on delayed cued recall.

Subjects	Experimental condition	Control condition	Mean
Rigid	8.4	9.7	9.05
Flexible	9.4	12.1	10.75
Mean	8.9	10.9	

TABLE - VII(c)

Showing ANOVA for 2x2 factorial design

Source of variation	Sum of square	df	Mean sum of square	F.ratio	Result
Rigidity/ Flexibility	28.9	1	28.9	22.23	$P < .01$
Type of organisation	40.0	1	40.0	30.77	$P < .01$
Rigidity/ Flexibility x type of organisation	4.9	1	4.9	3.77	$P < .01$
Within groups (Error)	47.8	36	1.3		
Total	121.6	39			

From Table VII(c) we observe that F ratio for personality variable, i.e., rigidity-flexibility is 22.23 which is significant at .01 level. The result suggests that rigidity and flexibility have differential effect on delayed cued recall. Disregarding type of organization, we find in Table VII(b) that the meanof means for rigid subjects is 9.05 (i.e. 8.4+9.7/2) and the mean of means for flexible subjects is 10.75 (i.e. 9.4+ 12.1/2). The result clearly reveals that mean recall score of rigid subjects is poorer than those of flexible subjects on delayed cued recall. It is, therefore, concluded that rigidity has more detrimental effect on delayed cued recall as compared to that of flexibility.

Similarly, F ratio for type of organization, as shown in Table VII(c), is 40.0 which is also significant at .01 level. The result indicates that colour and semantic organization have differential effect on delayed cued recall. Ignoring rigidity-flexibility variable, we find in Table VII(b) that the mean of means with colour clustering is 8.9 (i.e. 8.4+9.4/2)and the mean of means with semantic clustering is 10.9 (i.e. 9.7+12.1/2). Since the mean recall scores with colour clustering is markedly lower than the mean recall scores with semantic clustering, it is safely concluded that colour clustering has an adverse effect on delayed cued recall. In other

words, as in the case of immediate cued recall, recall performance with colour clustering is poorer than recall performance with semantic clustering on delayed cued recall. Thus the findings demonstrate that even with delayed cued recall test, recall performance is positively related to semantic clustering while it is negatively related to colour clustering.

F ratio for interaction between rigidity-flexibility and type of organization, as shown in Table-VII(a), is 3.77 which is insignificant. We may, therefore, infer that in case of delayed cued recall no interaction exists between rigidity flexibility and type of organization. From Table-VII(b), we find that the mean recall scores for both the rigid and flexible subjects are higher with semantic clustering than the mean recall scores with colour clustering. The mean recall scores for rigid and flexible subjects with semantic clustering are 9.7 and 12.1 respectively and the mean recall scores of rigid and flexible subjects with colour clustering are 8.4 and 9.4 respectively. Since both the group obtained high mean recall scores with semantic clustering than with colour clustering, we may safely conclude that there is no interactional effect of rigidity-flexibility and type of organization on delayed cued recall.

As stated earlier, F ratio were also calculated for the difference between immediate and delayed cued recall scores. This was done to know the differential effect of each independent variable, namely, rigidity-flexibility and type of organization on immediate and delayed cued recall.

To calculate the F ratios for the difference between immediate and delayed cued recall scores, a difference between immediate and delayed cued recall scores for each group under corresponding conditions was obtained.

The difference between immediate and delayed cued recall scores and their mean scores are given in Table-VIII(a) and VIII(b) respectively. F ratios for the difference are shown in Table VIII(c).

TABLE-VIII(a)

Showing difference between immediate and delayed cued recall scores for each of the four groups of subjects under corresponding conditions.

No.of sub-jects	Rigid experimental condition		d	Rigid control condition		d	Flexible experimental condition		d	Flexible control condition		d
	Immediate recall	Delayed recall		Immediate recall	Delayed recall		Immediate recall	Delayed recall		Immediate recall	Delayed recall	
1	10	8	2	13	10	3	9	10	-1	14	12	2
2	12	9	3	12	10	2	12	11	2	13	13	0
3	9	11	-2	11	9	2	10	8	2	15	14	1
4	10	9	1	12	10	2	10	10	0	14	13	1
5	11	7	4	12	8	4	11	10	1	12	10	2
6	8	7	1	10	11	-1	9	9	0	14	13	1
7	11	10	1	12	10	2	10	9	1	15	12	3
8	10	7	3	13	10	3	10	8	2	13	11	2
9	9	8	1	10	8	2	8	9	-1	13	11	2
10	10	8	2	13	11	2	11	10	1	14	12	2
Total			16			21			7			16

TABLE - VIII(b)

Showing mean of the difference between immediate and delayed cued recall scores for each of the four groups of subjects.

Subjects	Experimental condition	Control condition	Mean
Rigid	1.6	2.1	1.85
Flexible	0.7	1.6	1.15
Mean	1.15	1.85	

TABLE - VIII(c)

Showing F ratios for the difference of immediate and delayed cued recall scores for each of the four groups of subjects.

Source of variation	Sum of square	df	Mean sum of square	F.ratio	Result
Rigidity/ Flexibility	4.9	1	4.9	3.06	NS
Type of organization	4.9	1	4.9	3.06	NS
Rigidity/ Flexibility x type of organization	0.4	1	0.4	0.25	NS
Within groups - (Error)	57.8	36	1.6		
Total	68.0	39			

NS = Not significant

A perusal of Table VIII(c) reveals that F ratio for variation in personality variable i.e., rigidity-flexibility is 3.06 which is insignificant. The result suggests that rigidity-flexibility has no differential effect on immediate and delayed cued recall. Disregarding type of organization, we find in Table VIII(b) that the mean of means for rigid subjects is 1.85 (i.e. 1.6+ 2.1/2) and the mean of means for flexible subjects is 1.15 (i.e. 0.7 + 1.6/2). The difference between these two means is too small to be statistically significant. We may, therefore, conclude that rigidity and flexibility do not affect immediate and delayed cued recall differentially. However, the mean of means for the two groups suggest that rigid subjects perform slightly better on immediate cued recall than on delayed cued recall, whereas flexible subjects perform slightly better on delayed cued recall than on immediate cued recall, though the differences are statistically insignificant. To be more clear, we may note here that delayed cued recall scores were substracted from immediate cued recall scores for each group. Thus, a larger difference would show facilitative effect on immediate cued recall and adverse effect on delayed cued recall. Similarly, smaller difference would reveal detrimental effect on immediate cued recall but facilitative effect on delayed cued recall.

F ratio for type of organization (Table-VII(c) is 3.06 which is also insignificant. It means that type of organisation does not affect immediate and delayed cued recall differentially. Ignoring rigidity-flexibility variable, we find in Table-VIII(b) that the mean of means with semantic clustering is 1.85 (i.e. 2.1 + 1.6/2) and mean of means with colour clustering is 1.15 (i.e. 1.6 + 0.7/2). Again, we find a slight difference between these two means but the difference is too small to be statistically significant. It may, therefore, be concluded that type of organisation does not affect immediate and delayed cued recall differentially. Though statistically insignificant, a trend is found in favour of better immediate cued recall than delayed cued recall with semantic clustering and better delayed cued recall than immediate cued recall with colour clustering.

F ratio for interaction between rigidity-flexibility and type of organisation is 0.25 (Table VIII(c) which is also insignificant, suggesting thereby that in terms of difference between immediate cued recall scores and delayed cued recall scores, no interaction exists between rigidity-flexibility and type of organisation. The result leads us to conclude that there is no interactional effect of rigidity-flexibility and type of organization on the difference of immediate and delayed cued recall.

DISCUSSION

The main objectives of the present investigation, as mentioned in chapter II, were to determine the effects of the presence of both semantic and perceptual features of word lists on clustering and cued recall and to determine the role of personality variable, i.e. rigidity-flexibility, in the manner by which subjects organized material in immediate and delayed cued recall. More specifically, this research investigated the significant role of personality predisposition, i.e. rigidity-flexibility, in processing information. We were particularly interested in examining the hypotheses that rigid subjects would be more susceptible to superficial processing and therefore less likely to process materials semantically. Flexible subjects, on the contrary, would encode material more by semantic categories, and therefore less likely to process material superficially. Furthermore, it was expected that rigid subjects would perform more poorerly in terms of word recalled than flexible subjects.

Turning our attention to the results reported in Table II and III, we find that mean colour clustering score of rigid subjects on immediate cued recall test is higher than mean colour clustering score of flexible subjects. Similarly, mean colour clustering score

obtained by rigid subjects on delayed cued recall is slightly higher than mean colour clustering score obtained by flexible subjects, though the difference between these two means is insignificant. These results clearly demonstrated that rigid subjects clustered more by colour on immediate and delayed cued recall tests than flexible subjects. However, rigid subjects do not differ significantly in colour clustering scores on delayed cued recall with those of flexible subjects.

Table IV and V show that the mean semantic clustering score obtained by flexible subjects on immediate as well as on delayed cued recall is markedly higher than the mean semantic clustering score obtained by rigid subjects. It is, therefore, established that flexible subjects cluster more by semantic categories than rigid subjects under both immediate and delayed cued recall conditions. In short when given an option to encode both semantic and superficial features, rigid subjects encoded the superficial features more extensively than flexible subjects under both immediate and delayed cued recall conditions.

The overall results reveal that subjects having rigid personality disposition encode superficial perceptual features of the list (colour clustering) more extensively than flexible subjects whereas subjects having flexible personality dispositon encode semantic

categories (semantic clustering) more extensively than rigid subjects. In other words, the degree of rigidity is positively related to colour clustering and negatively to semantic clustering. On the other hand, the degree of flexibility is positively related to semantic clustering and negatively to colour clustering.

As mentioned elsewhere rigid subjects, by their very nature, show the tendency to perseverate or resist to any change in mental sets, habits, beliefs, mode of thinking and behaviour even when they are no longer appropriate. For this reason they are not able to make efficient use of effortful learning processes (Tyler, Hertel, McCallum, and Ellis, 1979; Hasher and Zacks, 1979). Thus in experimental condition, when given an option to encode both semantic and superficial features, rigid subjects might have concentrated on more obvious superficial perceptual features of the list (i.e. colour) and did not try to determine more effective and relevant way of organising the information (i.e. semantic features of the list). Flexible subjects, on the other hand, by their nature, might be more efficient in the use of effortfull processes such as organisation and consequently they organise the list using more effective semantic features. Hence rigid subjects clustered more extensively by colour as compared to their flexible counterparts.

Under control condition where only clustering by semantic categories was possible, rigid subjects clustered less by semantic categories than flexible subjects. Here it may be recalled that numerous researchers have demonstrated that information is encoded more effectively if it is processed actively and effortfully and involves reorganization of the materials (cf. Ellis et al., 1974; Ellis et al. 1975; Jacoby, 1978; Slamecka & Graf, 1978; Tyler et al.1979). Since rigid subjects as compared to flexible subjects were found to impose stereotypical representation upon incoming information and refrained from producing an assortment of hypotheses or strategies (Conden, Ellis & Feency, 1979), they are relatively less likely to be effective in reorganizing the incoming information and consequently they clustered less by semantic categories than did the flexible subjects. These findings provide empirical support to the suggestion made by Hasher & Zacks (1979) who suggested that rigidity in information processing is related to the inefficient use of effortful learning processes. Furthermore, these findings also provide empirical support to attentional-discrimination hypothesis proposed by Ellis and Franklin (1983) to account for differences between externals and internals in organizing the incoming informations. Our findings suggest that rigid subjects were readily distracted from more effective ways of encoding and organizing

verbal information when given the opportunity to organize information according to superficial non-semantic categories. Rigid subjects were perhaps less effective in discriminating between semantic and less useful perceptual features of the list. Thus when presented words with a highly salient colour background which allowed for a simple mode of organization, rigids were more likely to seize upon this opportunity rather than search for more subtle semantic cues.

As stated in chapter II, several investigators have regarded rigidity-flexibility as a potent determiner of learning and memory. The present investigation attempted to determine the differential effect of rigidity and flexibility on immediate and delayed cued recall. Table VI(c) and VII(c) clearly demonstrated that rigidity and flexibility have differential effect on immediate as well as on delayed cued recall. The mean recall scores, as shown in Table VI(b) and VII(b), obtained by rigid subjects are markedly lower than mean recall scores obtained by flexible subjects on both immediate and delayed cued recall test. It was, therefore, concluded that rigidity has more pronounced adverse effect on immediate as well as on delayed cued recall as compared to flexibility. In other words, rigid subjects show poorer immediate and delayed cued recall than flexible subjects.

The results revealed that degree of rigidity is negatively related to recall performance whereas the degree of flexibility is positively related to recall performance on both immediate and delayed cued recall. These findings are consistent with the results obtained by Cosden, Ellis, and Feency (1979) and Hasher & Zacks (1979). Cosden et al.(1979) demonstrated poorer recall of rigid subjects than those of flexible subjects. They examined the effect of cognitive flexibility in recall with perceptual grouping tasks, and found that organizational processes involved in their task were influenced by the individual level of cognitive flexibility. Cosden et al. found that subjects classified as rigid, on the basis of measures of cognitive flexibility-rigidity, showed impaired recall. Similarly, Hasher & Zacks (1979) found that rigidity in information processing is related to the inefficient use of effortful learning processes. The results of the present study also provide partial support to the study conducted by Akhtar et al.(1972) and Imam (1975) who observed that rigidity has negative influence on incidental learning. Thus, the findings of the present research and also the findings obtained by Cosden et al.(1979) and Hasher & Zacks (1979) indicate that task-irrelevant cognitive activities associated with rigidity compete with task-relevant information for space in working memory. Since cognitive functioning associated

with depression has been described as inflexible or rigid (Beck, 1967; Kovacs & Beck, 1978), it is reasonable to suggest that the poor memory associated with rigidity may be attributed to the inefficient use of effortful processes such as organisation. This suggestion gains strength from the facts that the effects of rigidity in this study are somewhat analogous to the impaired recall of depressed subjects obtained by Leight and Ellis (1981). This rigidity of cognitive processes might be related to other constructs which have been associated with depressive psychological deficit, such as learned helplessness (Miller & Seligman, 1975), and external locus of control (Hiroto, 1974). The relation between cognitive rigidity and these other explanatory constructs remains an area for future research.

The present study, as mentioned in chapter II, was also undertaken to determine the differential effect of colour and semantic clustering on immediate and delayed cued recall. Turning our attention to the results obtained in Table VI(c) and VII(c), we find that colour and semantic clustering have differential effect on immediate as well as on delayed cued recall. The mean recall scores with semantic clustering are substantially higher than mean recall scores with colour clustering on immediate and delayed cued recall. Thus, it is found that the recall performance with colour clustering is

poorer than the recall performance with semantic clustering under both immediate and delayed cued recall conditions. The words presented over different colour backgrounds resulted in a suppression of clustering by semantic categories and reduced word recall. In other words, recall performance is positively related to semantic clustering while negatively related to colour clustering. An interactional effect between rigidity-flexibility and type of organization is found on immediate cued recall but not on delayed cued recall. These findings show greater influence of colour encoding at immediate than at delayed cued recall and further suggest that clustering by colour is a relatively transitory phenomenon. This contention gains strength from the observed interactional effect of rigidity-flexibility and type of organization on immediate cued recall and absence of such interactional effect on delayed cued recall.

These findings are in agreement with the results obtained by Ellis & Franklin (1983) who reported that the degree of semantic organization is positively related to list recall; in contrast, higher level of colour organisation is related to decreased recall. These results also provide indirect empirical support to the study conducted by Craik & Lockhart (1972) and Moscovitch & Craik (1976) who found that material processed at deeper, elaborated or more distinctive levels will be more effectively encoded and retained than material encoded superficially.

Another consideration which motivated the present investigator to undertake this study, as mentioned in chapter III, was to determine the differential effect of each independent variable, i.e. rigidity-flexibility and type of organisation on the difference of immediate and delayed cued recall. Table VIII(c) clearly demonstrated that rigidity-flexibility has no differential effect on immediate and delayed cued recall. Though statistically insignificant, mean recall score of rigid subjects is slightly higher than mean recall score of flexible subjects, indicating that rigid subjects perform slightly better on immediate cued recall than on delayed cued recall whereas flexible subjects perform relatively better on delayed cued recall thanon immediate cued recall. In other words, the degree of rigidity is positively related to immediate cued recall and negatively to delayed cued recall. On the contrary, the degree of flexibility is positively related to delayed cued recall and negatively to immediate cued recall, though the difference is statistically insignificant.

Similarly, colour and semantic clustering have no differential effect on immediate and delayed cued recall. Though statistically insignificant, a trend is found in favour of better immediate cued recall than delayed cued recall with semantic clustering and better delayed cued recall than immediate cued recall with colour clustering.

An interactional effect of rigidity-flexibility and type of organization on immediate and delayed cued recall is also found insignificant.

These findings lead us to conclude that same processes operate in immediate and delayed cued recall and are consistent with the findings obtained by Melton (1963) and Craik & Jacoby (1974) who also demonstrated that same processes operate in short-and long-term memory.

SUMMARY

SUMMARY

Study of the complex organizational processes involved in learning of verbal items and their impact on subsequent retention has achieved special prominence in experimental psychology in recent years. Over the years, there have been several rather different, approaches to the the problem of clustering or organization. The term organization refers to the relations between to-be-remembered items. Bousfield (1953) defines organization as the occurrence of sequences of related words presented in random orders for learning. Organization has also been defined as a process through which certain relationships among the set of verbal items are established (Mandler, 1972). In its operational sense, organization refers to the discrepancy between the input and the output item orders (Tulving, 1968). Such organization occurs "when the output order of the items is governed by phonetic or semantic relations among items or by subject's prior extra-experimental or intra-experimental acquaintance with the items constituting the list (Tulving, 1968).

There are three paradigms which have frequently been used for the study of organization, namely, categorical organization, associative organization, and subjective organization. These differ primarily in the

experimental treatment given for inducing clustering. Most of the studies to date have been concerned with the categorical organization - organization based on semantic categories such as animals, birds, vegetables, professions, vehicles, and furnitures etc. Many investigators by using categorical organization have reported that words belonging to the same category tended to cluster together in the subjects output, which in turn aided the recall performance. Moreover, clustering and recall was found to be greater for high-frequency words than for low-frequency words (Bousfield, 1953; Bousfield & Cohen, 1953, 1955, 1956; Cohen, Bousfield & Whitmarsh, 1957; Bousfield, Cohen & Whitmarsh, 1958; Cofer, Bruce and Reicher, 1966; Holroyd & Holroyd, 1961; Ellis & Franklin, 1980). Similarly, studies on associative organization have shown superior clustering in recall protocols with a list of associated word pairs, i.e. associated word pairs tended to be recalled together (Jenkins & Russell, 1952). Another group of researchers has found that associative clustering, the tendency to recall the two members of each pair in succession, and word recall increased with higher inter-pair associative strength, (Jenkins, Mink, & Russell, 1958; Mathews, Marcer, & Morgan, 1964; Deese, 1959, 1961, 1965).

The third paradigm for the study of organization i.e., subjective organization, differs from other two paradigms in that the basis of organization is not

predetermined by the experimenter. A number of investigators have reported clustering in the recall of lists containing seemingly unrelated words, even when experimenter has intentionally thwarted the presence of an organizational base within the list (Tulving, 1962; Bousfield, Puff, & Cowan, 1964; Tulving, 1966; Mandler & Pearlstone, 1966).

It has also been established by several investigators that retrieval cues or reminders, specially if they are put into memory along with the to-be-remembered events, are important aids to memory (Dallett, 1964; Bilodeau, Fox & Blick, 1963; Tulving & Pearlstone, 1966; Earhard, 1967; Tulving & Osler, 1968; Thomson & Tulving, 1969; Tulving & Thomson, 1973; Lauer & Kroby, 1976). These researchers have reported that retrieval cues greatly facilitate recall performance. However, retrieval cues are effective only if they are present at both input and output phases of the task (Tulving & Osler, 1968). It is thus clear that retrieval cues are also an important determiner of retention.

There is growing evidence that information is encoded more effectively if it is processed actively and effortfully and involves reorganization of the materials (cf. Ellis et al., 1974; Ellis et al., 1975; Jacoby, 1978; Slamecka & Graf, 1978; Tyler et al., 1979). Most recently, Ellis and Franklin (1983) examined the effects of having

both a semantic and a superficial perceptual category for organizing lists of words in free recall, and also examined the effect of a personality variable i.e. locus of control on the susceptibility to superficial features. When given an option to encode both semantic and superficial feature, subjects with an external locus of control encoded the superficial features more extensively than internals, in addition with this option, external showed poorer free recall. Ellis & Franklin (1983) demonstrated that under ordinary free recall instructions in which the opportunity to organize lists semantically or superficially was equally present for both internals and external, the externals were much more susceptible to superficial organization and showed significantly poorer recall than internals.

However, there may be an alternative explanation for the results obtained by Ellis & Franklin. It might be possible that subjects with an external locus of control were inefficient in the use of effortful processes such as organization and consequently they organize the list using less effective perceptual features. Since it is established by several investigators that inefficient use of effortful learning processes is related to cognitive rigidity (Tyler, Hertel, McCallum & Ellis, 1979; Hasher and Zacks, 1979; Leight & Ellis, 1981), it is,

therefore, reasonable to assume that findings obtained by Ellis & Franklin (1983) might be explained in terms of cognitive rigidity-flexibility. Thus, an important consideration which influenced the thinking of the present investigator to undertake the present research was the presence of considerable body of evidence to suggest that cognitive rigidity-flexibility is a potent determiner of retention. The term rigidity has been used widely to refer to the ways of thinking and behaving which are not responsive enough to change in the demands. It has been defined as "the inability to change one's set when the objective conditions demand it (Rokeach, 1948), as "a tendency to perseverate and resist conceptual change, to resist the acquisition of new pattern of behaviour and to refuse to relinquish old and established patterns (Shaie, 1955).

A thorough survey of literature on learning and memory reveals that few studies have been conducted in relation to cognitive rigidity-flexibility. For example, Akhter et al.(1972) and Iman (1975) have reported that rigidity is negatively related to incidental learning. Cosden, Ellis, and Feency (1979) also demonstrated poorer recall of rigid subjects than those of flexible subjects, i.e. rigidity impaired recall. Similarly, Hasher & Zacks (1979) and Leight & Ellis (1981) observed that rigidity in information processing is related to the

inefficient use of effortful learning processes. However, there is no adequate experimental work available relating rigidity-flexibility-personality predisposition, to organizational processes and its effect on retention and recall. The present research was, therefore, designed to investigate the significant role of a personality predisposition, i.e. rigidity-flexibility, in processing information. More specifically, the present study was undertaken to determine the differential effect of rigidity-flexibility and type of organization, i.e. colour and semantic organization, on immediate and delayed cued recall.

Thus, in the light of the aforementioned relation between cognitive rigidity-flexibility and memory, we hypothesized that rigid subjects would encode the superficial perceptual features of the list more extensively than flexible subjects. Flexible subjects, on the other hand, would cluster more by semantic categories than rigid subjects. It was further expected, based on the first two predictions, rigid would perform more poorely in terms of words recalled than flexible subjects.

Finally, we would also explore whether or not individual differences in this personality trist (e.g. cognitive rigidity-flexibility) affects immediate and delayed cued recall differentially and is there any interactional affect of cognitive rigidity-flexibility

and semantic-perceptual features of the list on immediate and delayed cued recall. The findings of the present study may enhance our understanding about human memory system.

A 2x2 factorial design in which one task variable and one personality variable, each varying in two ways, was used in this experiment. The two values of task variable were (a) superficial organization and (b) semantic organization. The personality variable was varied by selecting (a) rigid and (b) flexible subjects. Thus there were four groups of subjects, namely, rigid with superficial organization, rigid with semantic organization, flexible with superficial organization, and flexible with semantic organization. These four groups of subjects were tested for immediate and delayed cued recall. Thus it yielded eight observations on four groups of subjects.

Eighty undergraduate students of Aligarh Muslim University served as subjects in the present study. They were assigned to two groups, namely, rigid and flexible, on the basis of scores obtained by them on Hindi version of GSR scale (Ali, 1975). Half of the subjects of each group served under experimental condition (Colour organization), and the other half served under control condition (semantic organization). Thus, there were four groups each consisting of 20 subjects.

Subjects were tested individually and subjects of each group were tested alternatively. The apparatus used in this experiment was an electrically operated memory drum in which timing device was so adjusted as to allow for each word to be exposed for two seconds at a regular interval of two seconds in between two exposures. Two stimulus lists, namely, a randomized categorical list of 16 words for semantic organization and a randomized colour-blocked list of the same 16 words for colour organization, were employed in this experiment.

The data obtained were tabulated groupwise and statistically treated to draw necessary inferences. t-test and analysis of variance were employed. F ratios were calculated separately for immediate and delayed cued recall. F ratios were also calculated for the difference between immediate and delayed cued recall scores with a view to determine the differential effect of each independent variable (i.e. rigidity-flexibility and type of organisation) on immediate and delayed cued recall.

The main findings of the present study were as follows:

(i) Rigid subjects encoded superficial perceptual features of the list more extensively than their flexible counterparts under both immediate and delayed cued recall test, but a significance of

difference was obtained under immediate cued recall test only. On the contrary, flexible subjects encoded semantic categories of the list more extensively than those of rigid subjects under both immediate and delayed cued recall test.

(ii) Rigidity was found to have detrimental effect on both immediate and delayed cued recall. In other words, rigid subjects showed poorer recall performance under both immediate and delayed cued recall test than those of flexible subjects.

(iii) Type of organization adopted by the subjects was also found to have differential effect on immediate as well as on delayed cued recall. Subjects using superficial perceptual features of the list (i.e. colour) showed poorer immediate and delayed cued recall than the subjects using semantic features of the list (i.e. semantic categories) In other words, recall performance was negatively related to colour clustering while positively related to semantic clustering.

(iv) Rigidity and flexibility had no differential effect on immediate and delayed cued recall.

(v) Type of organization (i.e. semantic and superficial clustering) adopted by the subjects had no differential effect on immediate and delayed cued recall.

(vi) An interactional effect between rigidity-flexibility and type of organization on immediate cued recall was found. No such interactional effect on delayed cued recall was observed.

(vii) No significant interaction was found between rigidity-flexibility and type of organization in terms of the difference between immediate cued recall scores and delayed cued recall scores.

The first two findings of the present study are consistent with the observations made by Tyler, Hertel, McCallum & Ellis (1979) Hasher & Zacks (1979). These findings are also consistent with the findings obtained by Cosden, Ellis & Prency (1979) and also provide indirect support to the results obtained by Akhtar et al.(1972) and Imam (1975). The effects of rigidity in this study are somewhat analogous to the impaired recall of depressed subjects obtained by Leight & Ellis (1981). These results are explained in the light of attentional-discrimination hypothesis proposed by Ellis and Franklin (1983).

The third finding of the present study is in agreement with the results obtained by Craik & Lokhart (1972) and Moscovitch and Craik (1976). It is also consonant with the results obtained by Ellis and Franklin (1983).

The ivth and vth findings provide empirical support to the model of human memory given by Melton (1963) and Craik & Jacoby (1974) and attempted to resolve the long standing controversy regarding the mechanism involved in short-and long-term memory.

Finally, future research is suggested to explore relation between rigidity and other explanatory constructs such as learned helplessness and locus of control with respect to recall performance.

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APPENDIX

HINDI ADAPTATION OF G S R SCALE

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निर्देश SCORE.....

नीचे कुछ कथान दिये हुए है जिसमें,सप्रत्येक के सामने दो उत्तर दिये हुए है । "हा"( ) तथा "नही"( ) आपको उत्तर देते समय कुछ भी लिखाना नही है, बल्कि कथानो ( ) को पढ़कर यह निश्चय करना है कि "हा"( )" और नहीं ( )" में से कौनसा उत्तर आपकी व्यक्तित्व विशेषता ( ) तथा कार्य करने के ढंग को सही सही प्रकट करता है । अगर कथान आपकी व्यक्तित्व ( ) के अनुसार हो तो आप "हाँ ( )" के खाने में ( ) का निशान लगा दें और यदि कथान व्यक्तित्व के अनुसार न हो तो "नहीं ( )" के खाने में ( ) का चिन्ह बनादें ।

इस बात का ध्यान रखो कि कोई भी कथान न छूटे । प्रत्येक कथान का उत्तर अवश्य दें और जल्दी देने का प्रयत्न करें । हम आशा करते हैं कि आपके सहयोग से यह परीक्षणाबनाने में सफल हो जायेगें ।

कृपया अब आप अपना कार्य शुरु करदें

1. किसी कार्य को चाहे वह कितना ही उलझा हुआ क्यों न हो एक बार हाथ में लेने के बाद उकता कर छोड़ देना मेरे लिए बहुत कठिन होता है । हाँ( ) नही( )

2. आमतौर से अधिकांश समस्याओं के हल करने का केवल एक ही उत्तर उपाय होता है । हाँ( ) नही( )

3. मुझे ऐसा कार्य अधिक पसन्द है जिसमें विस्तार(तफसील) पर ध्यान देना आवश्यक है । हाँ( ) नही( )

4. मैं अधिकांश(अक्सर) अपने कार्य में इतना खो जाता हूँ कि अन्य वस्तुओं पर ध्यान नही दे पाता । हाँ( ) नही( )

5. किसी कार्य को आरम्भ कर देने के बाद उसकी कार्य विधि (तरीकएकार) में परिवर्तन करना मुझे बिल्कुल पसन्द नही । हाँ( ) नही( )

6. मैं जिन रुढ़ियों और रस्म रिवाज का पावन्द हूँ उनके बरतने में कभी भूल नहीं करता । हाँ( ) नही( )

7. मैं अपने विचारों पर स्थान रहता हूँ चाहे अन्य लोगों के विचार मुझसे कितने भिन्न क्यों न हों । हाँ( ) नही( )

8. किसी कार्य को शुरु कर देने के बाद नियमित रुप से उसे करते रहना मेरे लिए सरल होता है । हाँ( ) नही( )

9. नई और अनोखी परिस्थितियों(हालात) के अनुकूल अपने आप को ढाल लेने में मुझे प्रसन्नता नहीं होती । हाँ( ) नही( )

10. साधारण से कार्य को भी आरम्भ करने से पूर्व अच्छी तरह सोच समझ लेना मैं आवश्यक समझता हूँ । हाँ( ) नही( )

11. मेरे जीवन का उद्देश्य अपने कर्त्तव्यों का पालन करना है। हाँ( ) नहीं( )

12. मैंने सामान्यत:(अक्सर) देखा है कि किसी समस्या के हल करने का मेरा अपना ही विशेष ढंग उचित होता है चाहे प्रारम्भ में उसमें सफलता दिखाई न दे । हाँ( ) नहीं( )

13. मैं जो कुछ भी करता हूँ नियमों और सिद्धान्तों के अनुसार(मुताबिक) करता हूँ । हाँ( ) नहीं( )

14. मैं इसी में बुद्धिमानी समझता हूँ कि कार्य इस प्रकार किया जाये जैसी लोगों में उसके करने की परम्परा(रिवाज) हो। हाँ( ) नहीं( )

15. मैं जो भी कार्य आरम्भ करता हूँ समाप्त करके ही छोड़ता हूँ भले ही वह कितना ही साधारण क्यों न हो । हाँ( ) नहीं( )

16. मेरे साथ अधिकांश यह होता है कि मैं किसी एक कविता की पंक्ति,धुन या वाक्य पर कई दिनों तक सोचता रहता हूँ । हाँ( ) नहीं( )

17. मेरे पढ़ने और कार्य करने का एक निश्चित कार्यक्रम है जिसका मैं नियमित रूप से पालन करता हूँ । हाँ( ) नहीं( )

18. बत्ती बुझा देने या दरवाजे में ताला बगैरह लगा देने के बाद मैं सामान्यत: इस बात का दुबारा इतमिनान कर लेता हूँ कि मैंने यह काम कर लिया है या नहीं । हाँ( ) नहीं( )

19. मैंने कभी कोई भयानक कार्य केवल उससे आनन्द उठाने के लिये नहीं किया है । हाँ( ) नहीं( )

20. मैं समझता हूँ कि निश्चित समय पर कार्य करना व्यक्तित्व (शख्सियत) की महत्वपूर्ण विशेषता है । हाँ( ) नहीं( )

21. मैं अपने कपड़ों की सजधज का बहुत ध्यान रखता हूँ । हाँ( ) नहीं( )

22. मैं जिस क्रम(तरतीब) से अपने कपड़े पहनता तथा उतारता हूँ वह सदैव एक सा रहता है । हाँ( ) नहीं( )

Thanks

Name ..... Roll No.....

Hostel/Place .... Date .....

HINDI ADAPTATION OF G S R SCALE

DEPARTMENT OF PSYCHOLOGY, A.M.U.ALIGARH

निर्देश SCORE.....

नीचे कुछ कथन दिये हुए हैं जिसमें प्रत्येक के सामने दो उत्तर दिये हैं । "हा"( ) तथा "नही"( ) आपको उत्तर देते समय कुछ भी लिखना नही है, बल्कि कथनों ( ) को पढ़कर यह निश्चय करना है कि "हा"( )" और नहीं ( )" में से कौनसा उत्तर आपकी व्यक्तित्व विशेषता ( ) तथा कार्य करने के ढंग को सही सही प्रकट करता है । अगर कथन आपकी व्यक्तित्व ( ) के अनुसार हो तो आप "हाँ ( )" के खाने में ( ) का निशान लगा दें और यदि कथन व्यक्तित्व के अनुसार न हो तो "नहीं ( )" के खाने में ( ) का चिन्ह बना दें ।

इस बात का ध्यान रखें कि कोई भी कथन न छूटे । प्रत्येक कथन का उत्तर अवश्य दें और जल्दी देने का प्रयत्न करें । हम आशा करते हैं कि आपके सहयोग से यह परीक्षणबनाने में सफल हो जायेंगे ।

कृपया अब आप अपना कार्य शुरू करदें

1. किसी कार्य को चाहे वह कितना ही उलझा हुआ क्यों न हो एक बार हाथ में लेने के बाद उकता कर छोड़ देना मेरे लिए बहुत कठिन होता है । हाँ( ) नही( )

2. आमतौर से अधिकांश समस्याओं के हल करने का केवल एक ही उत्तर उपाय होता है । हाँ( ) नही( )

3. मुझे ऐसा कार्य अधिक पसन्द है जिसमें विस्तार(तफसील(पर ध्यान देना आवश्यक है । हाँ( ) नही( )

4. मैं अधिकांश(अक्सर(अपने कार्य में इतना खो जाता हूँ कि अन्य वस्तुओं पर ध्यान नहीं दे पाता । हाँ( ) नही( )

5. किसी कार्य को आरम्भ कर देने के बाद उसकी कार्य विधि (तरीकएकार(में परिवर्तन करना मुझे बिल्कुल पसन्द नही । हाँ( ) नही( )

6. मैं जिन रूढ़ियों और रस्म रिवाज का पावन्द हूँ उनके बरतने में कभी भूल नहीं करता । हाँ( ) नही( )

7. मैं अपने विचारों पर स्थिर रहता हूँ चाहे अन्य लोगों के विचार मुझसे कितने भिन्न क्यों न हों । हाँ( ) नही( )

8. किसी कार्य को शुरू कर देने के बाद नियमित रूप से उसे करते रहना मेरे लिए सरल होता है । हाँ( ) नही( )

9. नई और अनोखी परिस्थितियों(हालात(के अनुकूल अपने आप को ढाल लेने में मुझे प्रसन्नता नहीं होती । हाँ( ) नही( )

10. साधारण से कार्य को भी आरम्भ करने से पूर्व अच्छी तरह सोच समझ लेना मैं आवश्यक समझता हूँ । हाँ( ) नही( )

11.

11. मेरे जीवन का उद्देश्य अपने कर्त्तव्यों का पालन करना है। हाँ( ) नहीं( )

12. मैंने सामान्यत:(अक्सर) देखा है कि किसी समस्या के हल करने का मेरा अपना ही विशेष ढंग उचित होता है चाहे प्रारम्भ में उसमें सफलता दिखाई दे दे । हाँ( ) नहीं( )

13. मैं जो कुछ भी करता हूँ नियमों और सिद्धान्तों के अनुसार(मुताबिक) करता हूँ । हाँ( ) नहीं( )

14. मैं इसी में बुद्धिमानी समझता हूँ कि कार्य इस प्रकार किया जाये जैसी लोगों में उसके करने की परम्परा(रिवाज) हो। हाँ( ) नहीं( )

15. मैं जो भी कार्य आरम्भ करता हूँ समाप्त करके ही छोड़ता हूँ भले ही वह कितना ही साधारण क्यों न हो । हाँ( ) नहीं( )

16. मेरे साथ अधिकांश यह होता है कि मैं किसी एक कविता की पंक्ति,धुन या वाक्य पर कई दिनों तक सोचता रहता हूँ । हाँ( ) नहीं( )

17. मेरे पढ़ने और कार्य करने का एक निश्चित कार्यक्रम हैं जिसका मैं नियमित रूप से पालन करता हूँ । हाँ( ) नहीं( )

18. बत्ती बुझा देने या दरवाजे में ताला बगैरह लगा देने के बाद मैं सामान्यत: इस बात का दुबारा इतमिनान कर लेता हूँ कि मैंने यह काम कर लिया है या नहीं । हाँ( ) नहीं( )

19. मैंने कभी कोई भयानक कार्य केवल उससे आनन्द उठाने के लिये नहीं किया है । हाँ( ) नहीं( )

20. मैं समझता हूँ कि निश्चित समय पर कार्य करना व्यक्तित्व (शख्सियत) की महत्वपूर्ण विशेषता है । हाँ( ) नहीं( )

21. मैं अपने कपड़ों की सजधज का बहुत ध्यान रखता हूँ । हाँ( ) नहीं( )

22. मैं जिस क्रम(तरतीब) से अपने कपड़े पहनता तथा उतारता हूँ वह सदैव एक सा रहता है । हाँ( ) नहीं( )

Thanks

Name ..... Roll No.....

Hostel/Place .... Date .....

DIAGRAMMATICAL DESIGN OF THE EXPERIMENT

Group-I	Rigid subjects	Received four trials on colour-blocked list of sixteen words belonging to four categories but arranged randomly.	Immediately after learning trials, colours were given as cues and subjects were asked to write down in any order as many words as they could recall within 3-minutes. Thus subjects were tested for immediate cued recall.	10 minutes interval during which subjects remained engaged in reading unrelated materials.
Group-II	Rigid subjects	Received four trials on randomised list of sixteen words belonging to four categories.	Immediately after learning trials, names of the categories were given as cues and subjects were asked to write down in any order as many words as they could recall within 3-minutes.	10 minutes interval during which subjects remained engaged in reading unrelated materials.
Group-III	Flexible subjects	Received four trials on colour-blocked list of sixteen words belonging to four categories but arranged randomly.	Immediately after learning trials, colours were given as cues and subjects were asked to write down in any order as many words as possible within 3-minutes.	10 minutes interval during which subjects remained engaged in reading unrelated materials.
Group-IV	Flexible subjects	Received four trials on randomised list of sixteen words belonging to four categories.	Immediately after learning, trials, names of the categories were given as cues and subjects were asked to write down in any order as many words as possible within 3-minutes.	10 minutes interval during which subjects remained engaged in reading unrelated materials.